ROCKY MOUNTAIN ARSENAL

NORTHWEST BOUNDARY CONTAINMENT/TREATMENT SYSTEM

OPERATIONAL ASSESSMENT REPORT

FY89

FINAL REPORT

BY

TECHNICAL OPERATIONS DIVISION
PROGRAM MANAGER, ROCKY MOUNTAIN ARSENAL
COMMERCE CITY, COLORADO 80022-2180

AUGUST 1990

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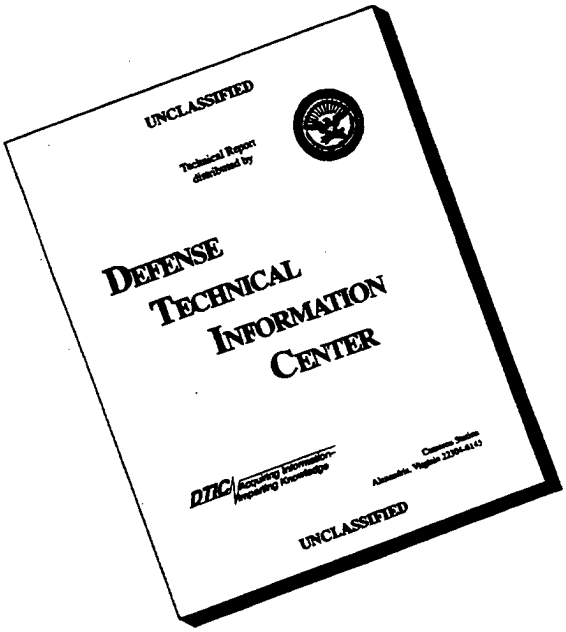

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PREFACE

This study was conducted as part of a cooperative effort by personnel from the Technical Operations Division (TOD) of the Program Manager for Rocky Mountain Arsenal (PMRMA) and the U.S. Army Engineer Waterways Experiment Station (WES). Funding for participation by WES was provided by the PMRMA via Intra-Army Order No. 0090. Project management was provided by Messrs. David W. Strang, TOD, Norman R. Francingues, WES Environmental Laboratory (EL) and James H. May, WES Geotechnical Laboratory (GL).

This study is the fourth operational assessment of the Northwest Boundary Containment/Treatment System at Rocky Mountain Arsenal (RMA). The contributing authors to this report were Messrs. Jack H. Dildine, Douglas W. Thompson, Norman R. Francingues (WES-EL), Richard J. Lutton, and John B. Palmerton (WES-GL). The study and report were authorized by the Program Manager for Rocky Mountain Arsenal.

The authors acknowledge the support and assistance of the following people and organizations during this study: Ms. Dianna Pantleo and Ms. Tina Nowlin, D. P. Associates, and Ms. Tommie Ann Gard of A.S.K., Associates.

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CONVERSION FACTORS, U.S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U.S. customary units of measurement used in this report can be converted to metric (SI) units as follows.

Multiply	By	To Obtain
acre	4046.873	square metres
cubic feet	0.02831685	cubic metres
feet	0.3048	metres
feet per mile (U.S. statute)	0.1893936	metres per kilometre
gallons (U.S. liquid)	3.785412	cubic decimetres
horsepower (550 foot-pounds (force) per second)	745.6999	watts
inches	2.54	centimetres
miles (U.S. statute)	1.609347	kilometres
pounds (mass) per cubic foot	16.01846	kilograms per cubic metre
square feet	0.09290304	square metres
square miles	2.589998	square kilometres

NORTHWEST BOUNDARY CONTAINMENT/TREATMENT SYSTEM
OPERATIONAL ASSESSMENT REPORT FY89

PART I: INTRODUCTION

Background

1. The Northwest Boundary Containment/Treatment System* Operational Assessment described herein has been prepared to document and evaluate the performance related to the boundary system operations. This report covers the system operating period of FY89.

2. Ground-water contamination problems have existed in the area of the Northwest boundary of Rocky Mountain Arsenal (RMA) since the mid 1950's, when investigations were conducted by the Army Corps of Engineers. In 1975, a ground-water surveillance program for RMA was established. This regional surveillance task included the monitoring of wells in the arsenal boundary areas. Since that time, several problem definition studies and design investigations have been conducted by RMA and the Corps of Engineers. Subsequently, a ground-water surveillance program was initiated in 1978 specifically for the Northwest boundary.

3. As a result of the ground-water investigations in 1980, several contaminants including DIMP, DBCP, chloride, endrin and dieldrin were detected in a narrow plume of ground water leaving RMA to the north and northwest. Additional studies by RMA and the Corps of Engineers lead to the design and construction of the Northwest Boundary Containment/Treatment System (NWBS) that was completed in October 1984 (Figure 1). This was the third boundary ground-water contamination control system constructed and operated at RMA.

4. This report incorporates by reference major system descriptions and previous operations described in the report entitled "Northwest Boundary Containment/Treatment System Baseline Conditions, System Startup and Operational Assessment Report for FY85/86" (PMRMA 1987). The reader is referred to the basic report for detailed information concerning a complete physical description of the system. The basic report is catalogued at the Rocky Mountain Arsenal Information Center (RIC) library and is document number 88054R01.

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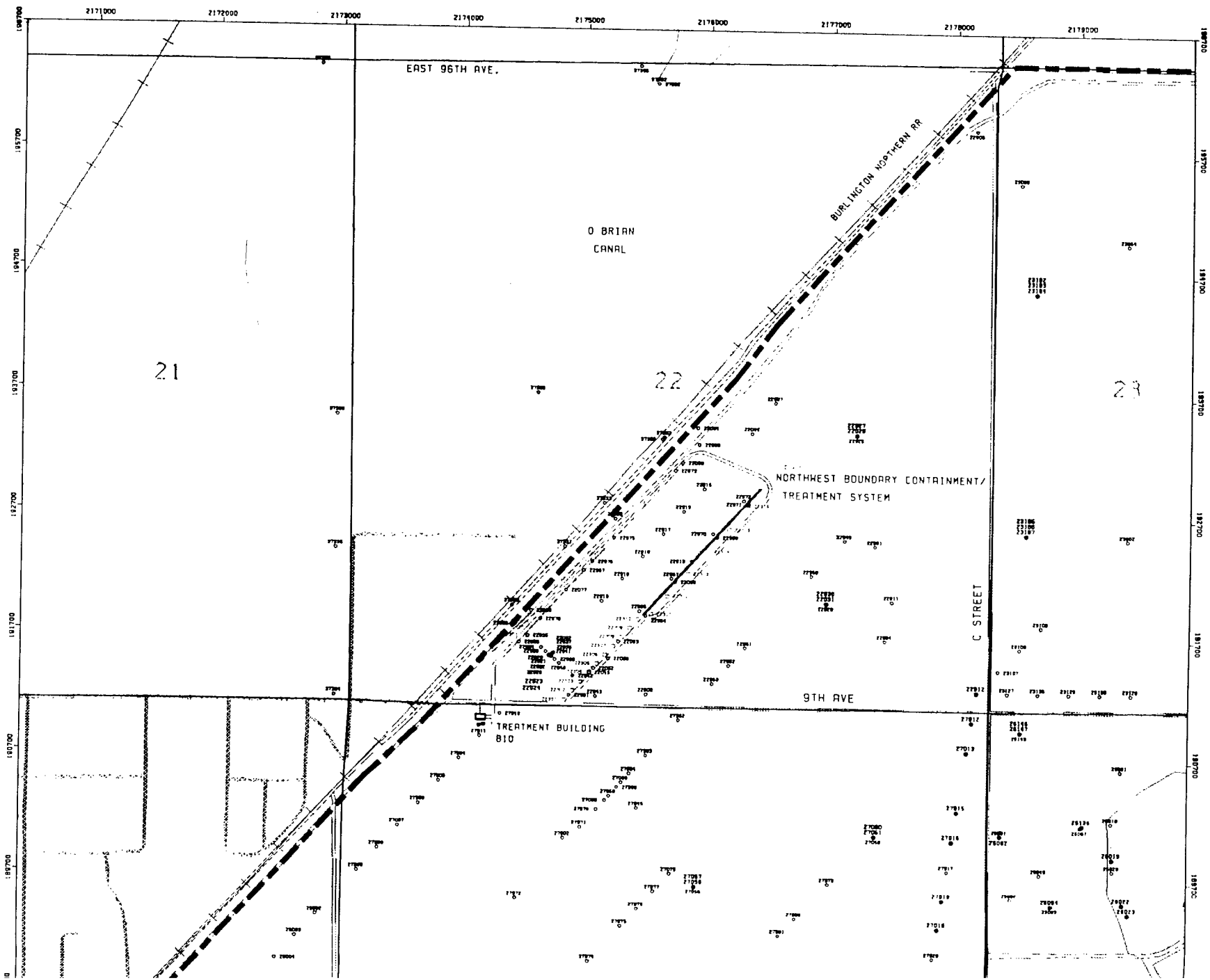
* Hereinafter referred to as Northwest Boundary System.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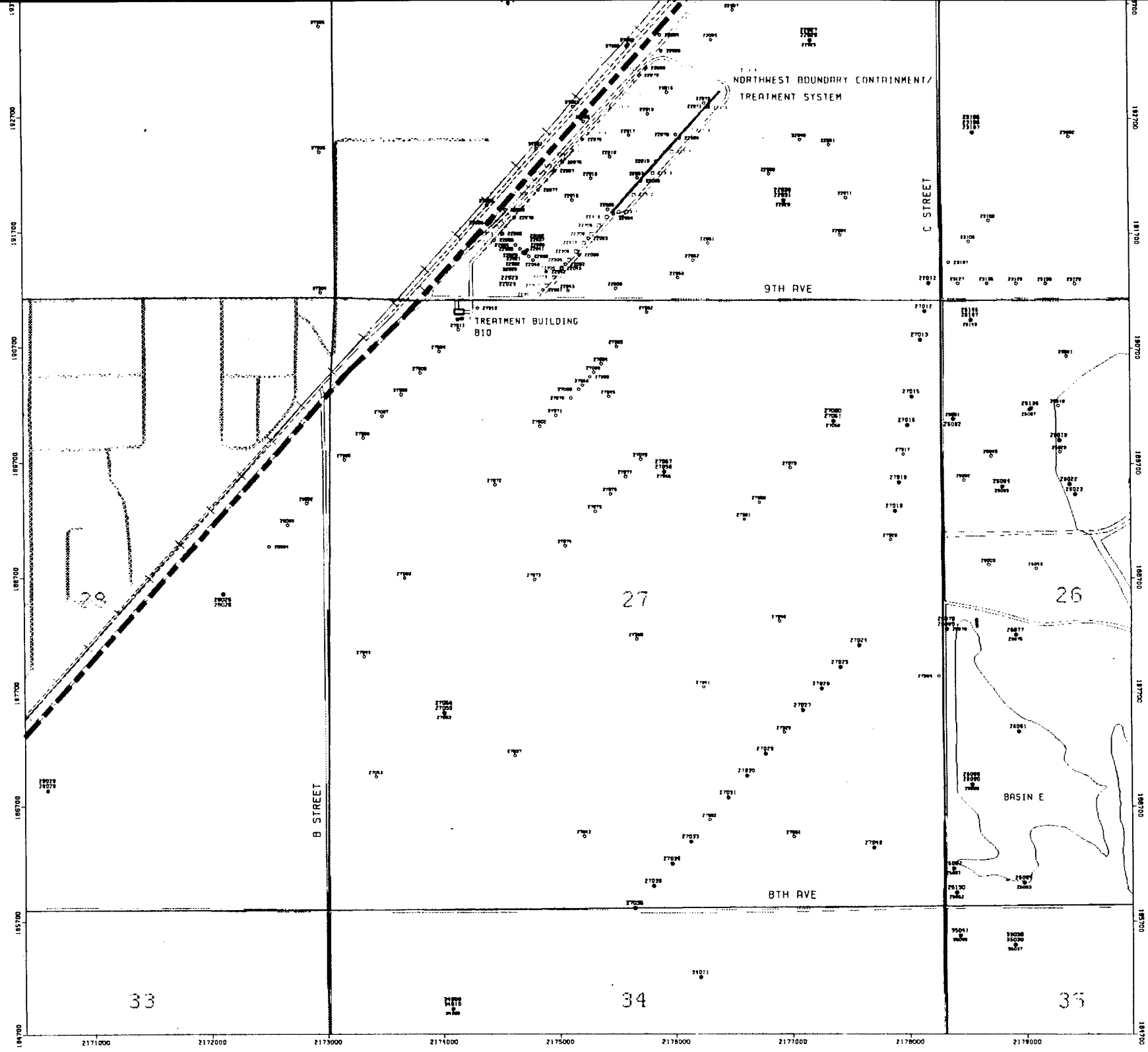
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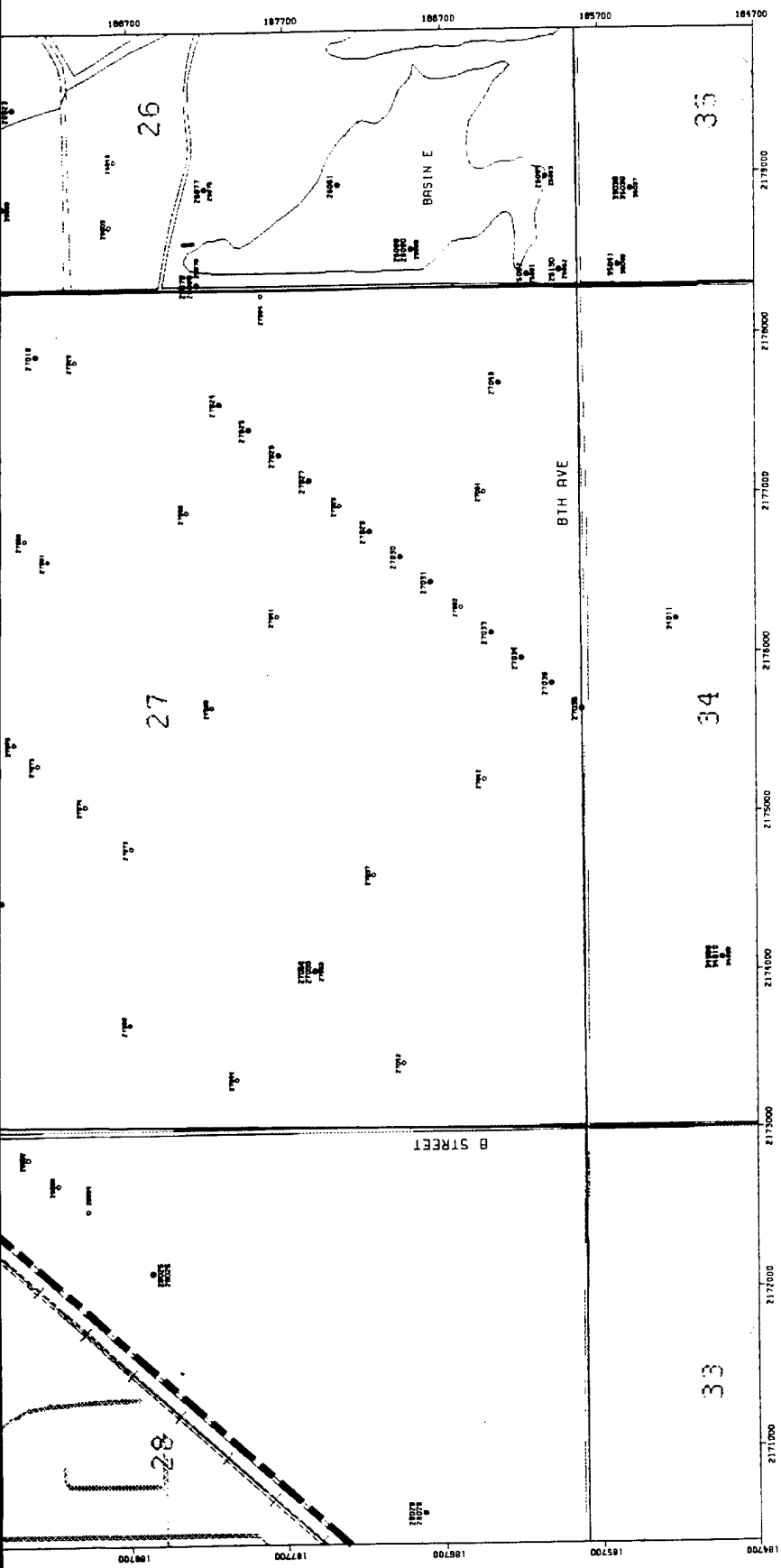
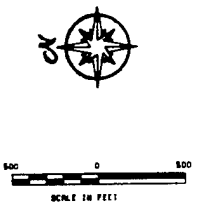


LEGEND

- Alluvial Monitoring Wells
- Denver Monitoring Wells
- Dewatering Wells
- Piezometers
- Recharge Wells
- Drainage
- Road
- Structure
- Trench
- Slurry Wall
- Arsenal Boundary



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ROCKY MOUNTAIN ARSENAL - DENVER, COLO.

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REVIEWED	
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EP ASSOCIATES, HUNTSVILLE AL	TENTIME, DENVER, COLORADO	
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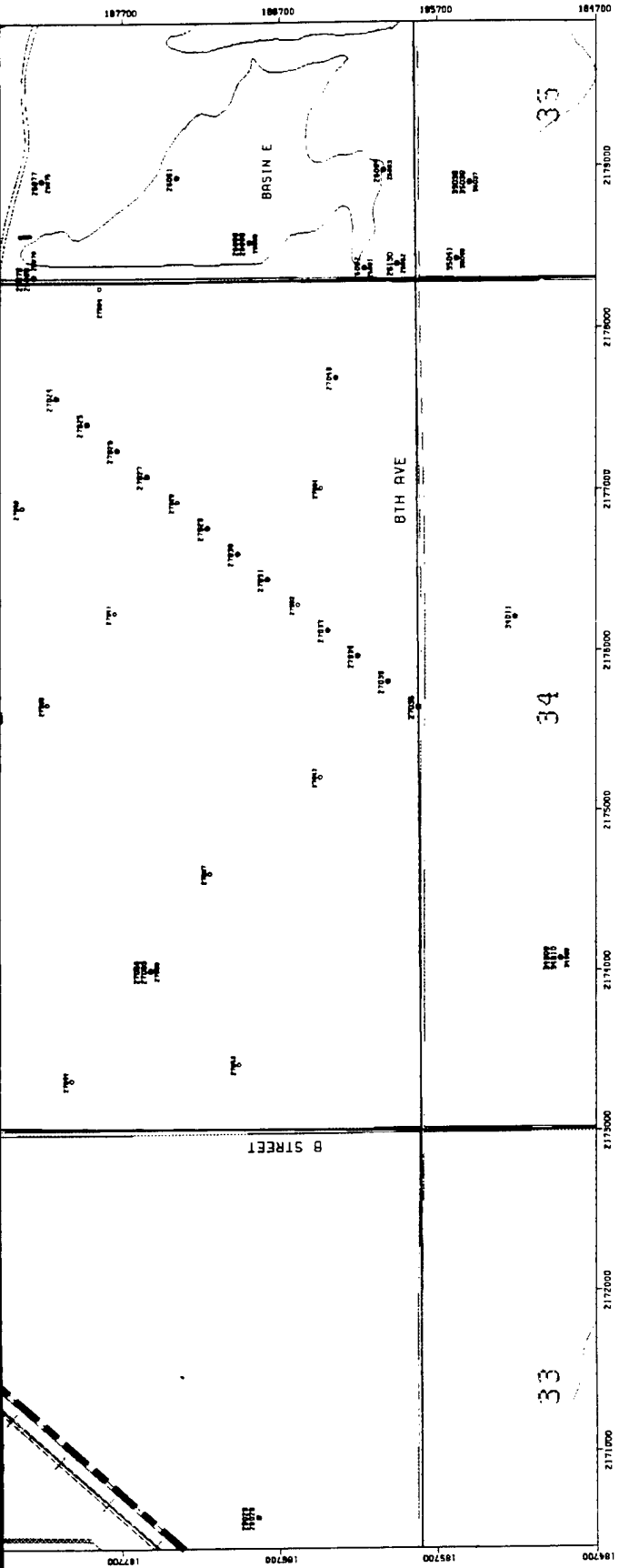

LEGEND

- Alluvial Monitoring Wells
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SYM	DESCRIPTION	DATE	APPROVED
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DEPARTMENT OF THE ARMY
ROCKY MOUNTAIN ARSENAL - DENVER, COLO.

DRAWN BY JLS - TT	Northwest Boundary Containment/Treatment System
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EP ASSOCIATES, HUNTSVILLE AL	TENTIME, DENVER, COLORADO	
CONTRACTOR	SUB CONTRACTOR	ENGINEERING OFFICE
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Report Objective

5. The objective of this report is to document the system operating parameters and performance during FY89, and, to identify and document any system improvements and facility alterations implemented during FY89.

Approach

6. The Technical Operations Division (TOD) at RMA provided the data base and general technical guidance. The U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi, provided specialized environmental engineering assessments.

7. The study was conducted in three phases. Data were retrieved and organized by the TOD and RIC. The data bases were reviewed by WES for completeness prior to conducting various system performance evaluations. During the course of study, several in-progress reviews and coordination working sessions were held at the RMA, to facilitate exchange of information and to assure continuity and consistency in data interpretations and evaluations. Finally, the report was assembled from individual sections prepared by the various contributing authors.

PART II: PLANT OPERATIONS MONITORING

8. The treatment plant monitoring program continued in FY89. It included collection of data on flow rates through the system, and the quality of the water entering and leaving the plant. The flow rates were recorded on a daily basis.

9. Samples were taken weekly from the interior of the adsorbers for process control. These data were used to determine when (if necessary) to change carbon within the adsorber. The qualities of the plant's influent and effluent waters were monitored by taking water samples on a weekly basis and analyzing them. Samples were also collected from the dewatering wells and analyzed. These samples were collected from ports located in the well pits.

10. All water samples were collected in previously cleaned, glass containers, sealed, and transported to the appropriate analytical laboratory at RMA or their contractor for analysis. The parameters for which the plant samples were analyzed for during FY89 are presented in Table 1. All analyses were performed using standard methods. The sample analysis and flow data were entered into the analytical data base by laboratory personnel, subjected to a quality control routine, validated, and placed into the PMRMA data base by the RIC. Data sets were prepared for use in developing tables and figures. Copies of the plant flow, analytical data and NWBS downtime for FY89 are contained in Appendices A, B, C, and D of this report.

Table 1

Chemical Analysis of Treatment Plant Samples

Analyte	FY89 Quarters 1st	2nd	3rd	4th
Organochlorine Pesticides				
Aldrin	X	X	X	X
Endrin	X	X	X	X
Dieldrin	X	X	X	X
Isodrin	X	X	X	X
Hexachlorocyclopentadiene		X	X	
p,p'-DDE		X	X	
p,p'-DDT		X	X	
Chlordane		X	X	
Volatile Organohalogens				
Chlorobenzene		X	X	
Chloroform		X	X	
Carbon Tetrachloride		X	X	
Trichloroethylene (TCE)	X	X	X	X
Tetrachloroethylene		X	X	
1,1 Dichloroethylene		X	X	
1,1 Dichloroethane		X	X	
1,2 Dichloroethane		X	X	
1,1,1 Trichloroethane		X	X	
1,1,2 Trichloroethane		X	X	
Methylene Chloride		X	X	
1,2 Dichloroethylene		X	X	
Organosulfur Compounds				
P-Chlorophenylmethylsulfone ($PCPMSO_2$)	X	X	X	X
P-Chlorophenylmethylsulfoxide (PCPMSO)	X	X	X	X
P-Chlorophenylmethylsulfide (PCPMS)	X	X	X	X
1,4-Dithiane	X	X	X	X
1,4-Oxathiane	X	X	X	X
Dimethyldisulfide (DMDS)		X	X	
Benzothiazole		X	X	
NP-Pesticides				
Vapona		X		
Supona		X		
Atrazine		X		
Malathion		X		
Parathion		X	X	

(Continued)

Table 1 (Concluded)

Analyte	FY89 Quarters 1st	2nd	3rd	4th
DCPD/MIBK				
Dicyclopentadiene	X	X	X	X
Methylisobutylketone		X	X	
Bicycloheptadiene			X	
DIMP/DMMP				
Diisopropylmethylphosphonate	X	X	X	X
Dimethylmethylphosphonate		X	X	
DBCP				
Dibromochloropropane	X	X	X	X
Inorganics				
Arsenic		X	X	
Chloride	X	X	X	X
Fluoride	X	X	X	X
Sulfate		X	X	
Alkalinity				
Calcium				
Cadmium				
Chromium				
Copper				
Cyanide				
Mercury				
Magnesium				
Potassium				
Sodium				
Combined (Nitrate/Nitrites)				
Lead				
Zinc				
Volatile Aromatics				
Toluene		X	X	
Benzene		X	X	
Xylene (o-, m-, p-)		X	X	
Ethylbenzene		X	X	
1,3 Dimethylbenzene		X	X	
GC/MS Analysis			X	

PART III: SYSTEM OPERATIONS

Operations Summary

11. A record of plant operations for the NWBS is maintained by RMA plant operating personnel with major events documented on a daily basis. The daily record contains information on the operations, maintenance activities, and repair of the treatment plant equipment and dewatering and recharge wells. The record also details other events such as plant downtime, equipment failure, and filter and carbon removal and replacement.

12. The performance of the Northwest Boundary System was very good during FY89 with minimal downtime being reported. The NWBS was never totally out of operation for more than 5.25 consecutive hours during the year. A summary of the downtime for each adsorber by quarter is presented in Table 2. Details on each downtime event are presented in Appendix D. The majority of the downtime was associated with leaks and plugged lines. As indicated in Table 2, no downtime was reported for the third and fourth quarters of FY89. There were no major physical alterations to the NWBS during FY89.

Table 2

Northwest Boundary System Treatment Plant

Downtime for FY89

	FY89 Quarter				
Adsorber	1st(hrs)	2nd(hrs)	3rd(hrs)	4th(hrs)	Total
V101	0.0	13.4	0.0	0.0	13.4
V102	25.8	20.7	0.0	0.0	46.5
V103	0.0	23.5	0.0	0.0	23.5
Plant	5.5	0.0	0.0	0.0	5.5

System Flow Quantities

13. The volume of water processed by the NWBS is recorded on a daily basis. The flow data recorded for FY89 are presented in tables in Appendix A of this report. Graphs of weekly flow data for each adsorber and the effluent have been prepared and are presented in Figures 2 through 5. The treatment

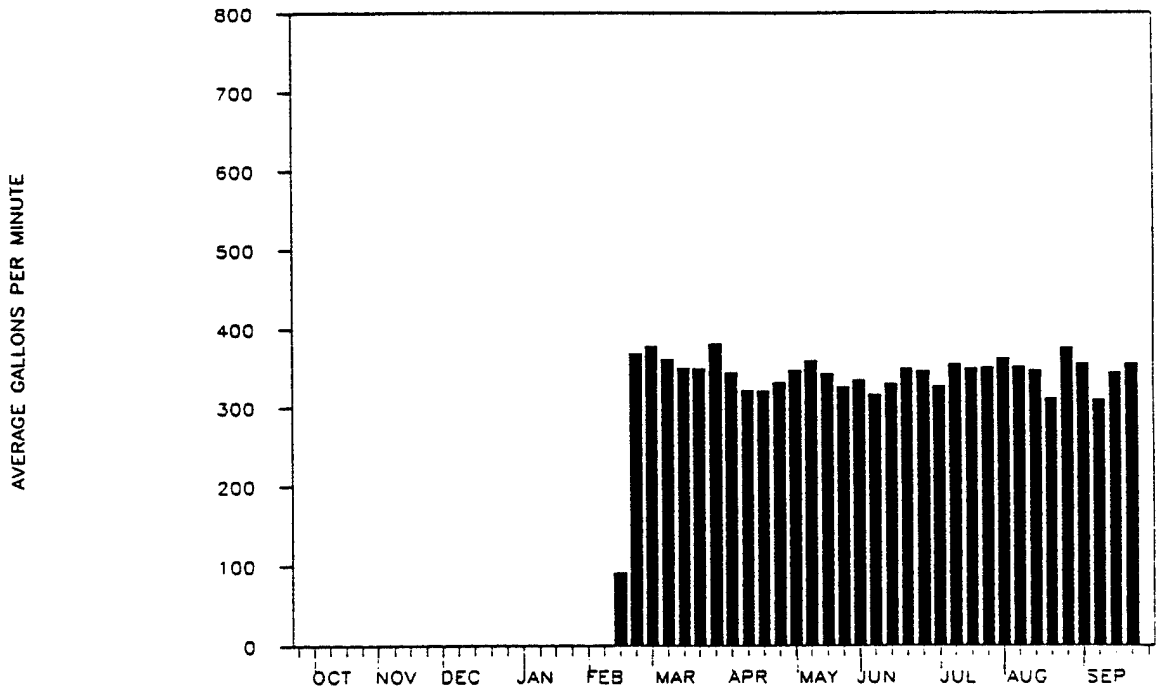


Figure 2. Adsorber 1 flow rate during FY89

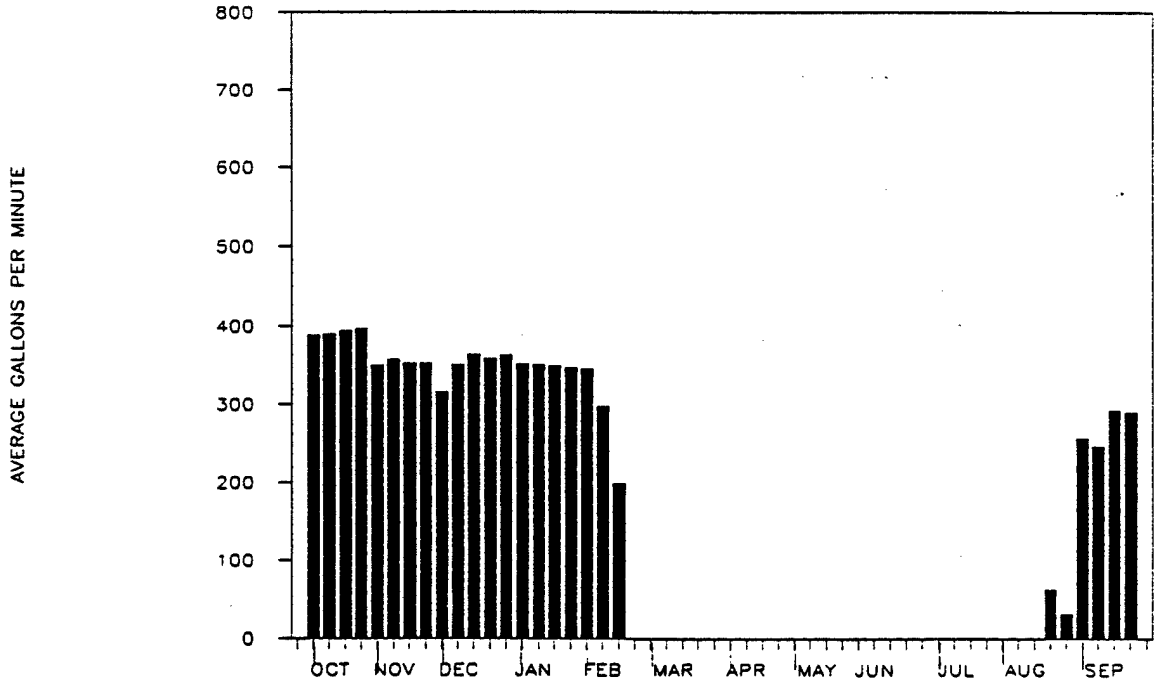


Figure 3. Adsorber 2 flow rate during FY89

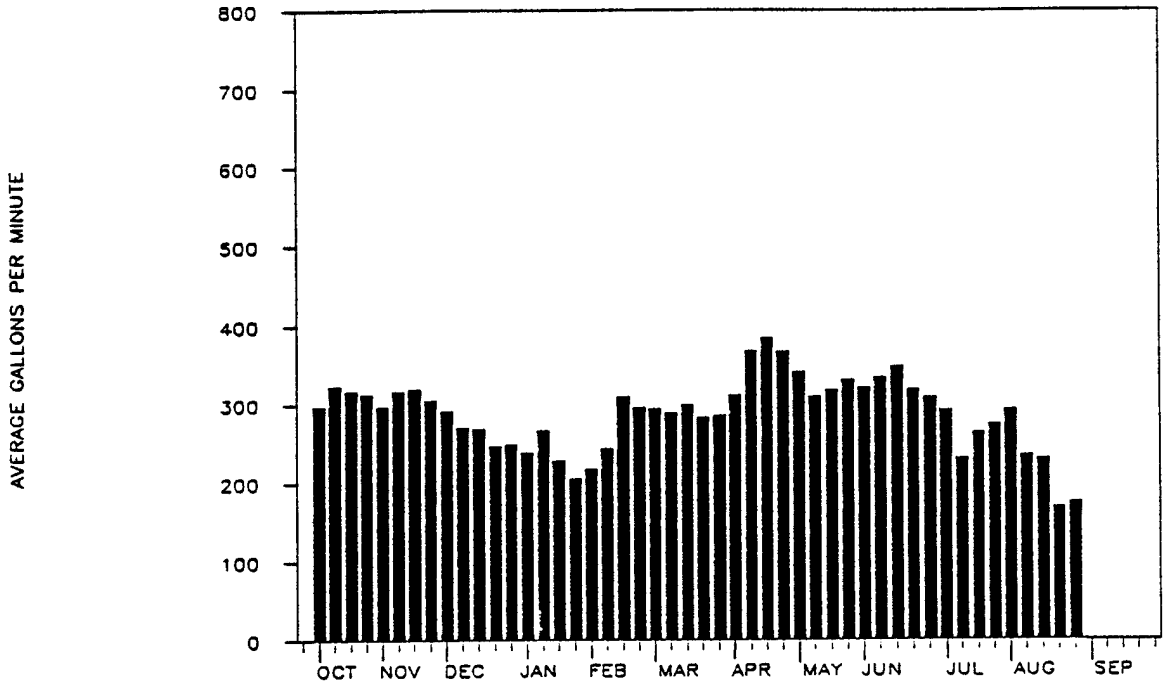


Figure 4. Adsorber 3 flow rate during FY89

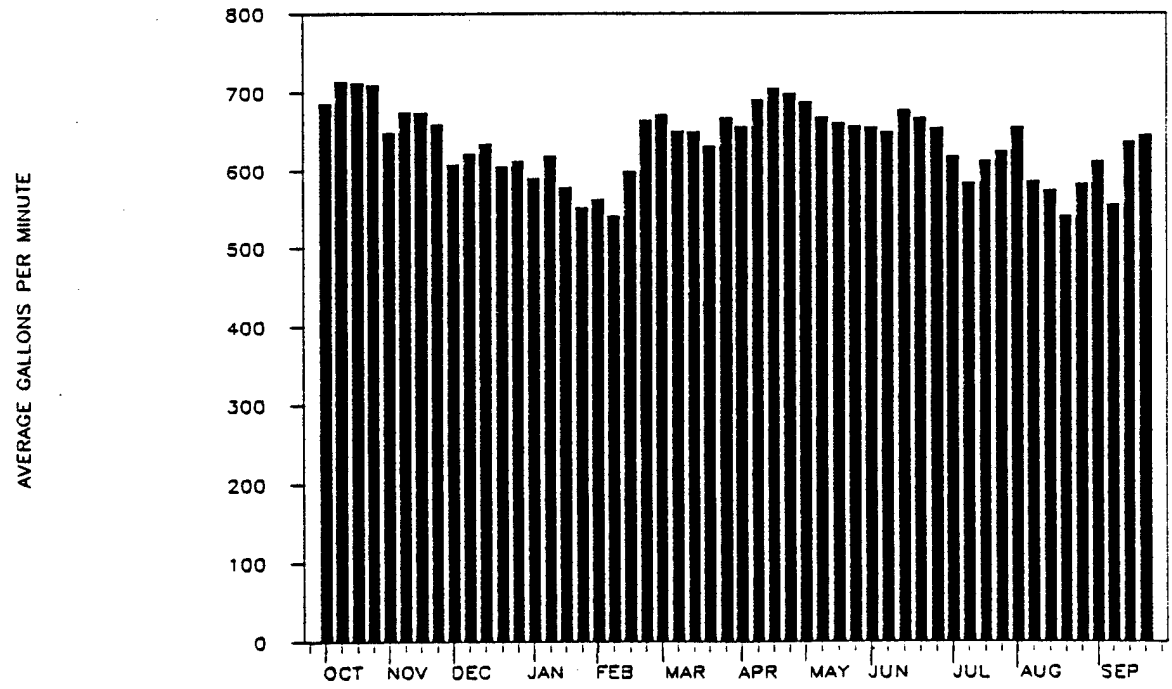


Figure 5. Effluent flow rate during FY89

plant flow data were recorded on a weekly (7 day) basis beginning with the first day of the FY and continuing through the end of the FY.

14. Periods of no flow were experienced by each of the adsorbers during various times of the year (see Figures 2-5). The optimal dewatering/recharge rate can be maintained using two adsorbers in parallel with the third adsorber being maintained in a standby status. During FY89, the total system flow rate (effluent) ranged from a low of 541 gpm to a high of approximately 714 gpm. Average adsorber and total flow rates and total gallons of water treated during FY89 are presented in Table 3. The total volume treated in FY89 was approximately 11.8 million gallons more than that treated in FY88. The average flow rate in FY89 was approximately 24.7 gpm greater than that for FY88. It should be noted that the flow rate through the system was increased at the end of FY88 to improve hydrologic conditions by increasing the volume of recharge along the northwest end of the system (see the FY88 Operational Assessment Report for more details). This increased flow was continued throughout FY89.

Table 3

FY 89 System Flow Quantities

Adsorber	Average Flow Rate (gpm)	Total Volume Treated (gal)
1	214.03	112,680,000
2	156.99	82,727,000
3	265.51	139,161,000
Total Effluent	636.53	334,568,000

System Influent and Effluent Water Quality

15. The quality of the influent and effluent from the treatment system is monitored periodically by taking grab samples and analyzing them. A single sample was collected from the influent sump to determine the quality of water flowing to the adsorbers. A single sample was collected from the effluent sump after treatment.

16. The influent and effluent samples were analyzed for the contaminants listed in Table 1 of this report. A statistical summary of the chemical

analysis data for the period October 1988 through September 1989 are presented in tabular form in Appendix B of this report. Graphs of the concentrations found for aldrin, chloride, chloroform, DIMP, dieldrin, endrin, fluoride, isodrin, parathion, sulfate, tetrachloroethylene, and trichloroethylene, over the reporting period (FY89) have been constructed and are presented in Figures 6 through 17. No concentrations of the other organic contaminants analyzed for in Table 1 in excess of their respective certified reporting limits were found in the samples collected during FY89. Therefore, no graphs were constructed for these undetected contaminants.

17. A separate graph has been constructed for each contaminant detected in the plant influent and effluent. Each graph presents a plot of the contaminant concentration reported and three lines indicating the certified reporting limit (CRL), the maximum operating limit (MOL) permitted, and the average concentration over the FY where sufficient data above CRL were available to calculate an average. The MOL used in this report is defined as the water quality criterion against which the operating performance of the treatment plant is compared in order to assess treatment effectiveness for the various contaminants of concern. A list of the MOL's used during the FY89 operational assessment is presented in Table 4. An average concentration was only computed for sets of data where 70 percent or more of the readings were above the CRL. When the criterion was met, values falling below the CRL were made equal to the CRL and included in the computations.

Aldrin

18. The CRL for aldrin (Figure 6) in FY89 was 0.05 ppb. The MOL for the NWBS treatment plant was 0.2 ppb. Two samples of plant influent out of 52 collected during the year were found to contain aldrin above the CRL with a maximum concentration of approximately 0.1 ppb which is well below the MOL. Three samples of plant effluent were found to contain aldrin in excess of the CRL but all concentrations were below the MOL.

Chloride

19. The CRL for chloride (Figure 7) was not reported. No MOL has been established. The concentration of chloride in the plant influent ranged from 200 ppm to 360 ppm with an average for the year of 260 ppm based on 54 samples. The concentrations in the plant effluent ranged from 200 ppm to 350 ppm with an average for the year of 261 ppm. As evidenced by the data, chloride was not removed from the ground water by the activated carbon treatment system.

Table 4

Maximum Operating Limits for Northwest Boundary System

Parameter	Maximum Operating Limit (MOL)	Source*
Aldrin	0.2 $\mu g/\ell$	Guidance from OTSG (Army) until standards are developed.
Chloride	N.A.	EPA Secondary Drinking Water Regulation standard is 250 mg/ℓ
Dibromochloropropane (DBCP)	0.2 $\mu g/\ell$	State of Colorado Department of Health limit per letter to Commander, RMA, 26 June 79.
Dicyclopentadiene (DCPD)	24.0 $\mu g/\ell$	The State of Colorado has requested the Army to meet a limit of 24 $\mu g/\ell$ for DCPD based on an odor threshold value.
Diisopropylmethyl-phosphonate (DIMP)	500 $\mu g/\ell$**	These criteria are recommended by the US Medical Bioengineering Research and Development Lab (26 Aug 76) and are based on toxicology studies (26 Aug 76) conducted by the Army. The National Academy of Sciences Committee on Military Environmental Research has reviewed the procedures and results of toxicology studies and concurred in the drinking water levels (1 Feb 77).
Dieldrin	0.2 $\mu g/\ell$	Guidance from OTSG (Army) until standards are developed.
Endrin	0.2 $\mu g/\ell$	EPA National Primary Drinking Water Regulation.
Fluoride	N.A.	EPA final Rule on Fluoride, National Primary and Secondary Drinking Water Standards, 40 CFR Parts 141, 142, and 143, maximum concentration limit is 4.0 mg/ℓ.

N.A. = Not Applicable

* Source: After Rocky Mountain Arsenal Contamination Control Program Management Team (1983)

** The Environmental Protection Agency's Office of Drinking Water Washington, D.C. issued a health advisory in December 1988 for DIMP not to exceed 600 $\mu g/\ell$.

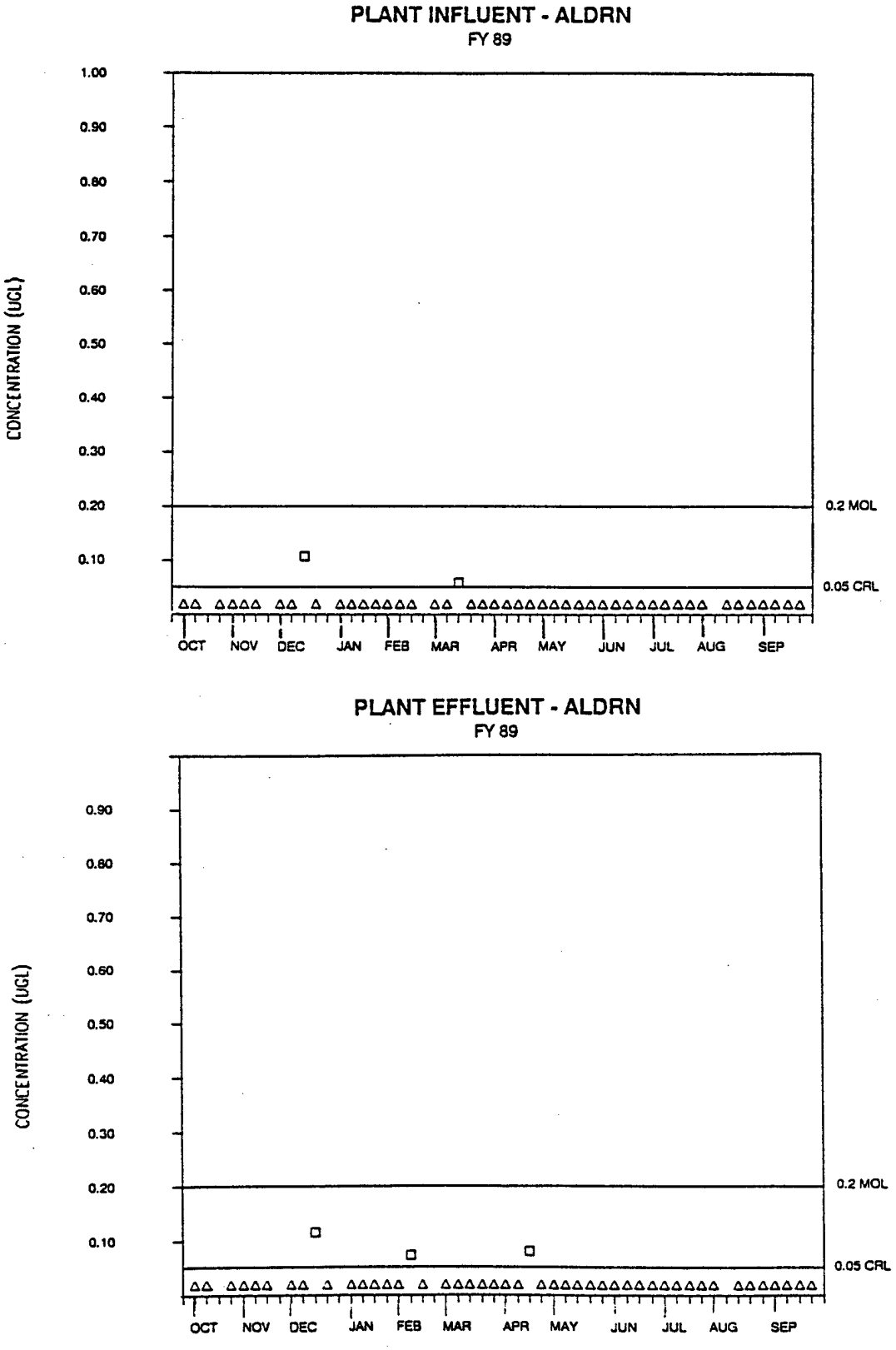


Figure 6. FY89 Aldrin concentrations

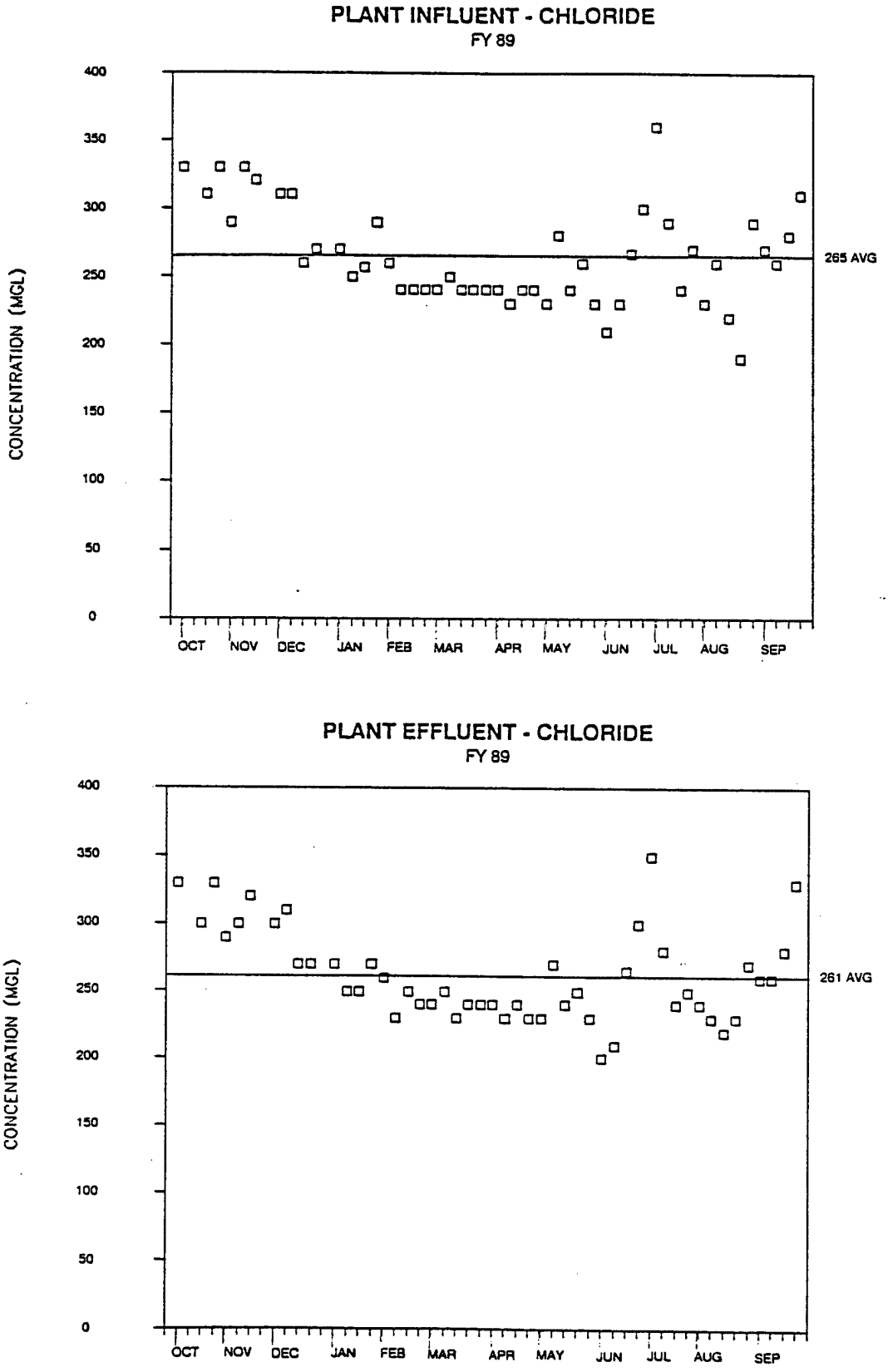


Figure 7. FY89 Chloride concentrations

Chloroform

20. The CRL for chloroform (Figure 8) is FY89 was 0.5 ppb. No MOL has been established. Only two samples each were collected from the plant influent and effluent streams. The maximum concentration in the influent was approximately 49 ppb with an average for the two samples of 34.7 ppb. The highest concentration in the effluent was approximately 23 ppb with an average for the two samples of 21.6 ppb. Chloroform is not as effectively adsorbed by activated carbon as are other organic contaminants found at RMA.

DIMP

21. The CRL for DIMP (Figure 9) in FY89 was 0.65 ppb. The MOL for the NWBS treatment plant was 500 ppb. All of the influent and effluent samples collected during the year, 51 and 49 samples, respectively, had DIMP concentrations in excess of the CRL. The concentrations generally ranged from 2 to 6 ppb with the exception of a sample collected in July, 1989. The influent sample on that date was reported as containing 860 ppb DIMP while the effluent sample was reported as containing 830 ppb. These values are probably anomalous since they are so much higher than any other values reported during the year. As a result, these values were not plotted and were not included in the calculation of the averages. The average DIMP concentrations in the influent and effluent were 3.32 ppb and 4.17 ppb, respectively.

Dieldrin

22. The CRL for dieldrin (Figure 10) in FY89 was 0.05 ppb. The MOL for the NWBS treatment plant was 0.2 ppb. Most of the 53 influent samples collected during the year had dieldrin concentrations in excess of the CRL. The maximum concentration reported was approximately 0.65 ppb. The average concentration in the influent over the year was 0.4 ppb. Only four samples of plant effluent were found to contain dieldrin in excess of the CRL with a maximum concentration of approximately 0.19 ppb. Thus, effluent concentrations did not exceed the MOL during FY89.

Endrin

23. The CRL for endrin (Figure 11) in FY89 was 0.05 ppb. The MOL for the NWBS treatment plant was 0.2 ppb. Only one sample of plant influent out of the 53 collected had an endrin concentration slightly in excess of the CRL. No concentrations of endrin above the CRL were found in the plant effluent.

Fluoride

24. The CRL for fluoride (Figure 12) was not reported. No MOL has been established. Concentrations of fluoride in the plant influent ranged from

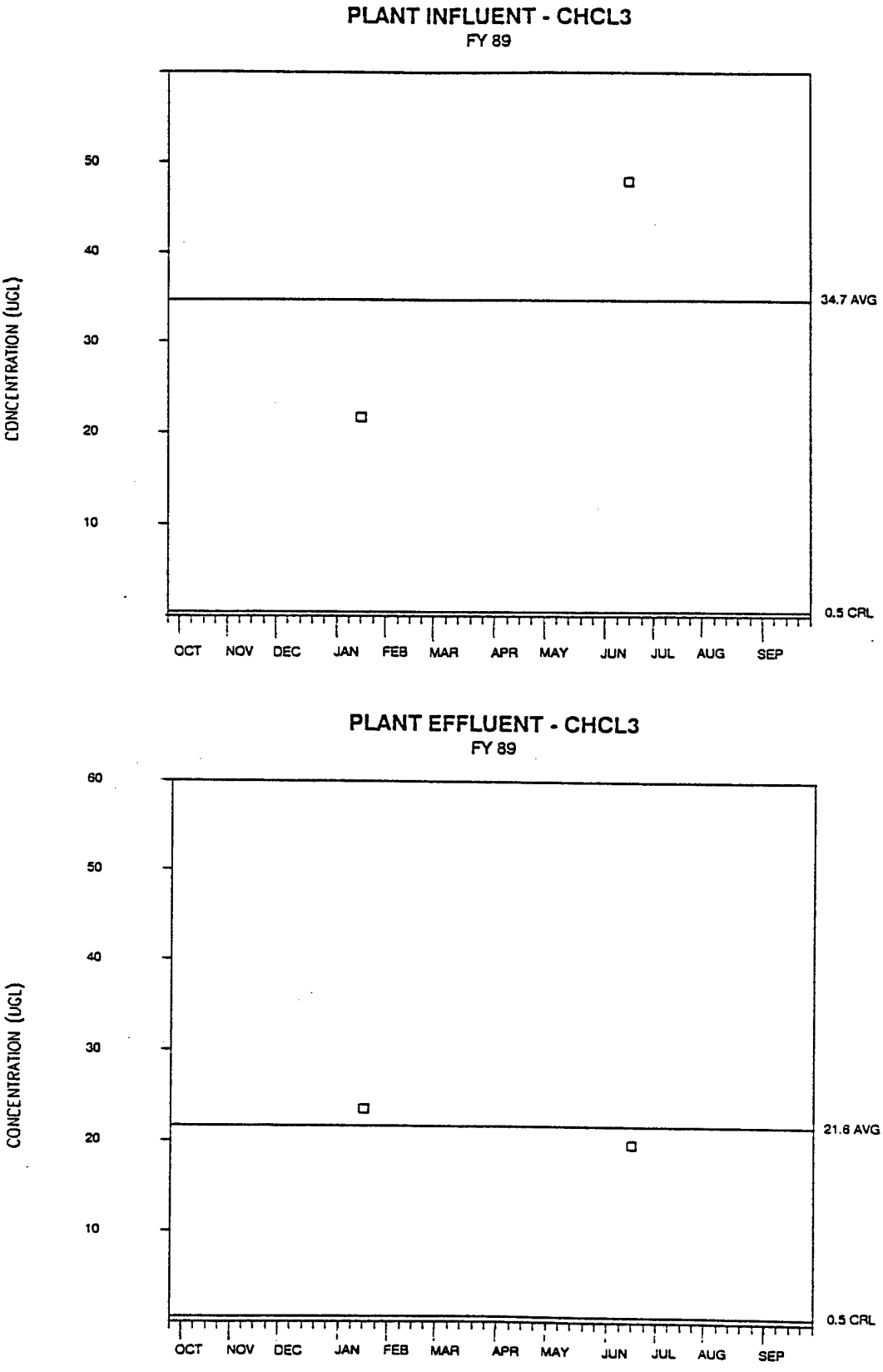


Figure 8. FY89 Chloroform (CHCL3) concentrations

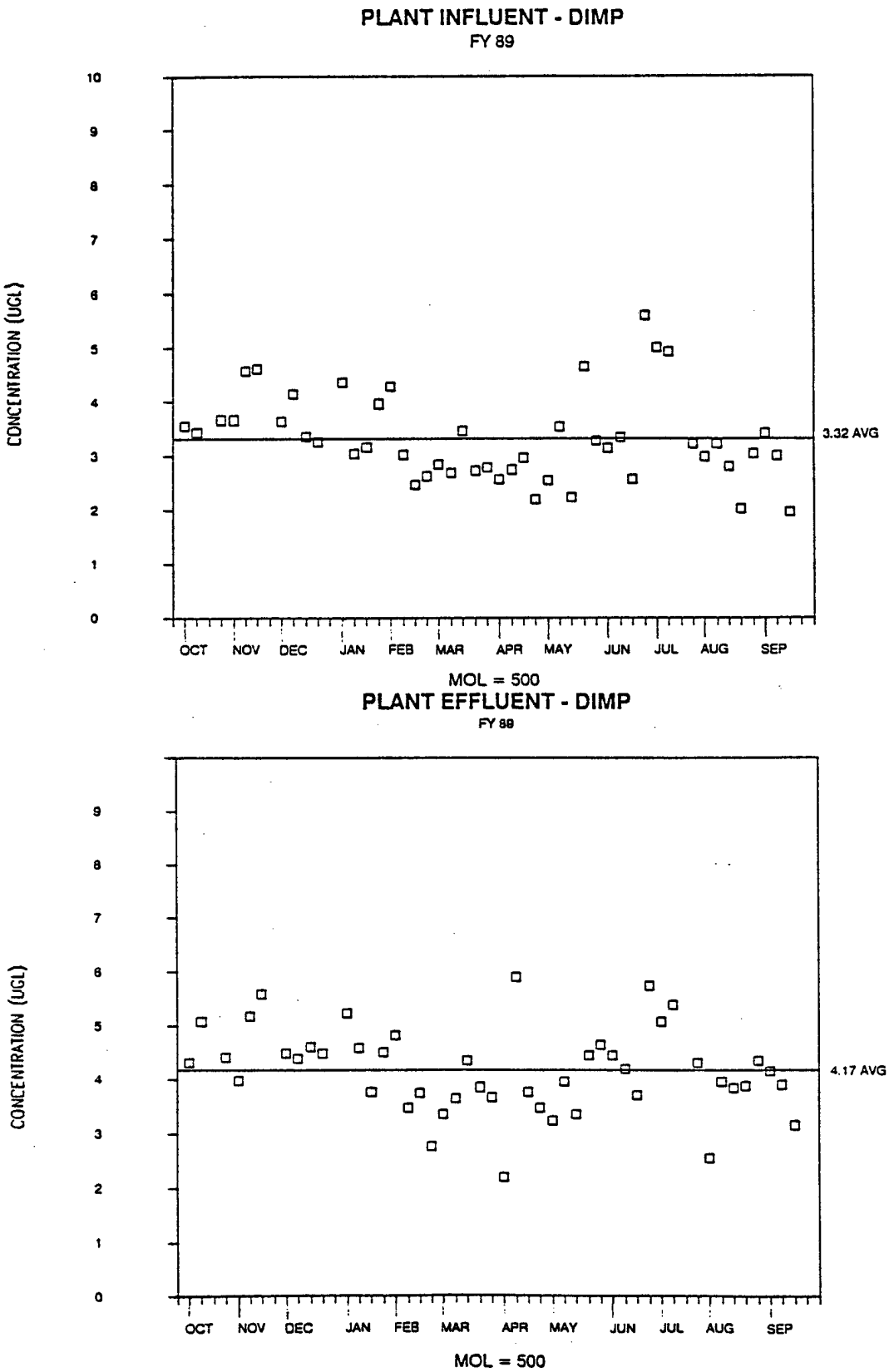


Figure 9. FY89 Diisopropylmethylphosphonate (DIMP) concentrations

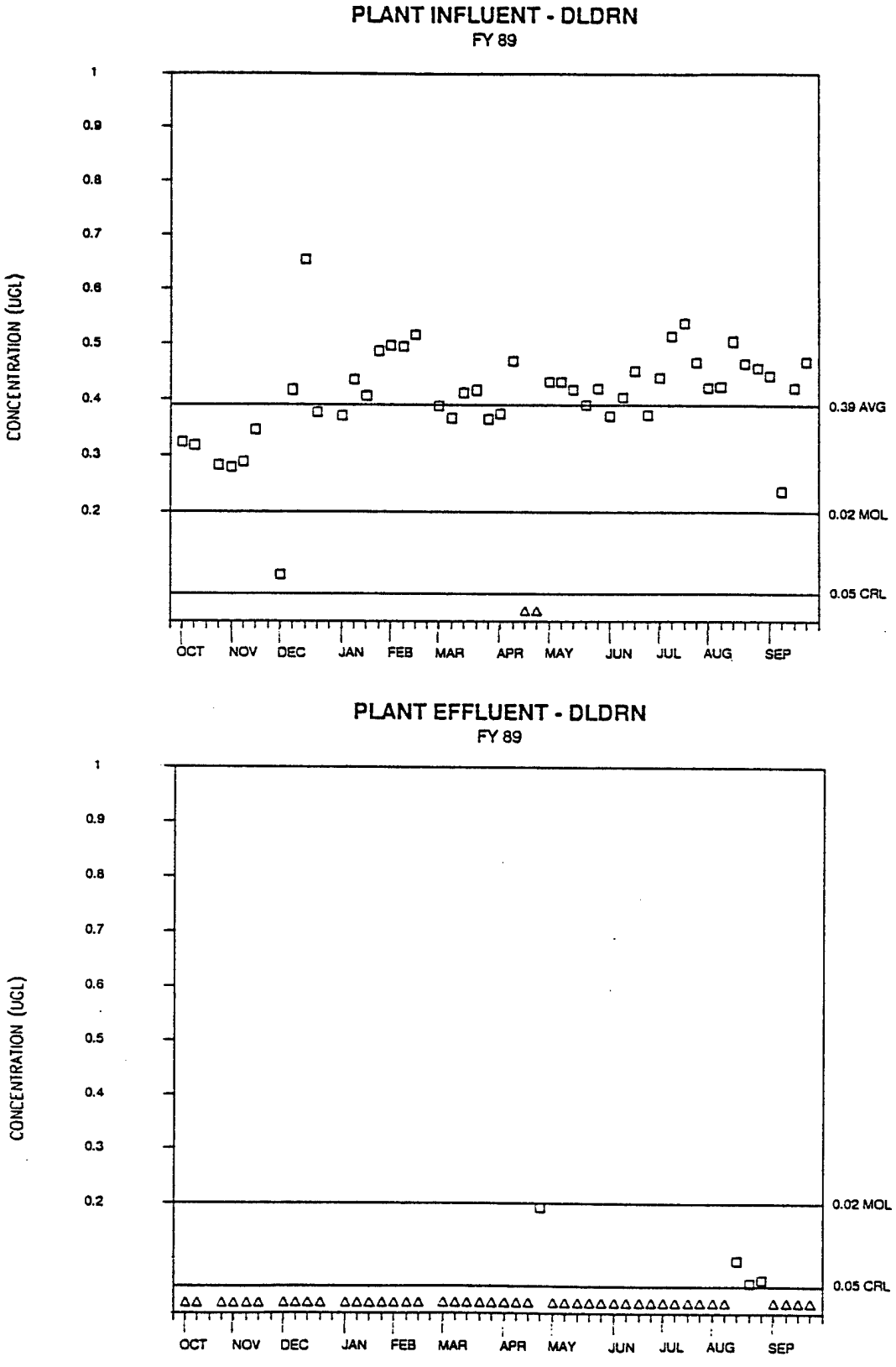


Figure 10. FY89 Dieldrin concentrations

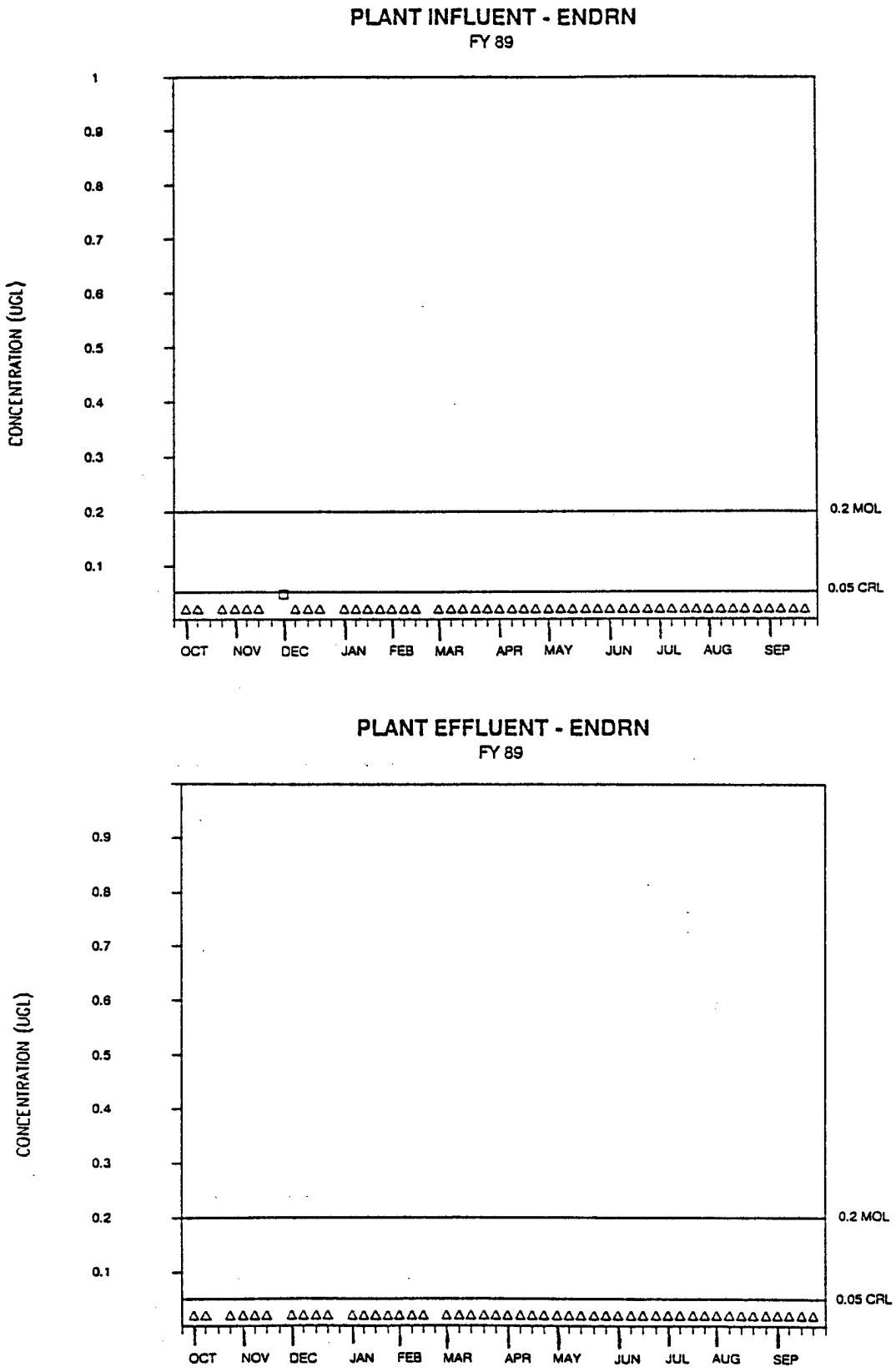


Figure 11. FY89 Endrin concentrations

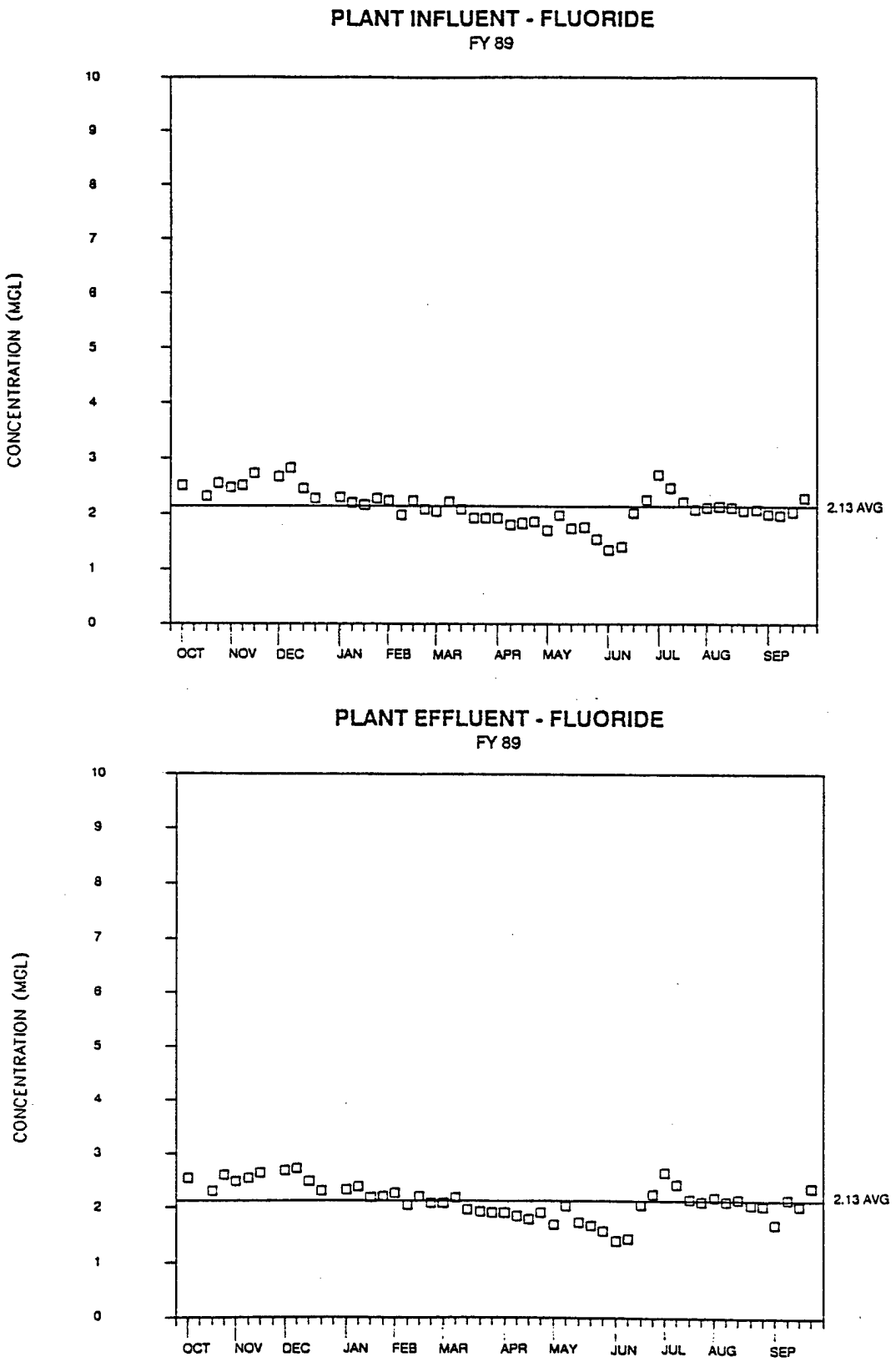


Figure 12. FY89 Fluoride concentrations

1.4 ppm to 2.8 ppm with an average for the year of 2.1 ppm. The concentrations in the plant effluent ranged from 1.4 ppm to 2.7 ppm with an average of 2.1 ppm. As the data indicate, fluoride was not removed from the ground water by the activated carbon treatment system.

Isodrin

25. The CRL for isodrin (Figure 13) was 0.051 ppb in FY89. No MOL has been established. Five influent samples out of the 53 collected during the year had isodrin concentrations above the CRL with a maximum reported concentration of 0.09 ppb. No concentrations of isodrin above the CRL were found in the plant effluent.

Parathion

26. The CRL for parathion (Figure 14) in FY89 was 0.647 ppb. No MOL has been established. Only two samples each were collected from the plant influent and effluent streams during the year. One of the samples of influent had a concentration of 1.8 ppb parathion while the other was below the CRL. One of the samples of effluent had a concentration of 1.7 ppb parathion while the other sample was reported to be less than the CRL.

Sulfate

27. The CRL for sulfate (Figure 15) was not reported. No MOL has been established. Only two samples each were collected from the plant influent and effluent streams during the year. The average concentrations for both the influent and effluent were 135 ppm. As the data indicate, sulfate was not removed from the ground water by the activated carbon treatment system.

Tetrachloroethylene

28. The CRL for tetrachloroethylene (Figure 16) was 0.75 ppb in FY89. No MOL has been established. Only one sample was collected from each of the plant influent and effluent streams during the year. The tetrachloroethylene concentration in the influent sample was below the CRL while the concentration in the effluent sample was approximately 2 ppb.

Trichloroethylene

29. The CRL for trichloroethylene (Figure 17) was 0.56 ppb in FY89. No MOL has been established. Only one influent sample out of the 54 collected had a trichloroethylene concentration in excess of the CRL at approximately 0.9 ppb. No concentrations of trichloroethylene above the CRL were found in the plant effluent.

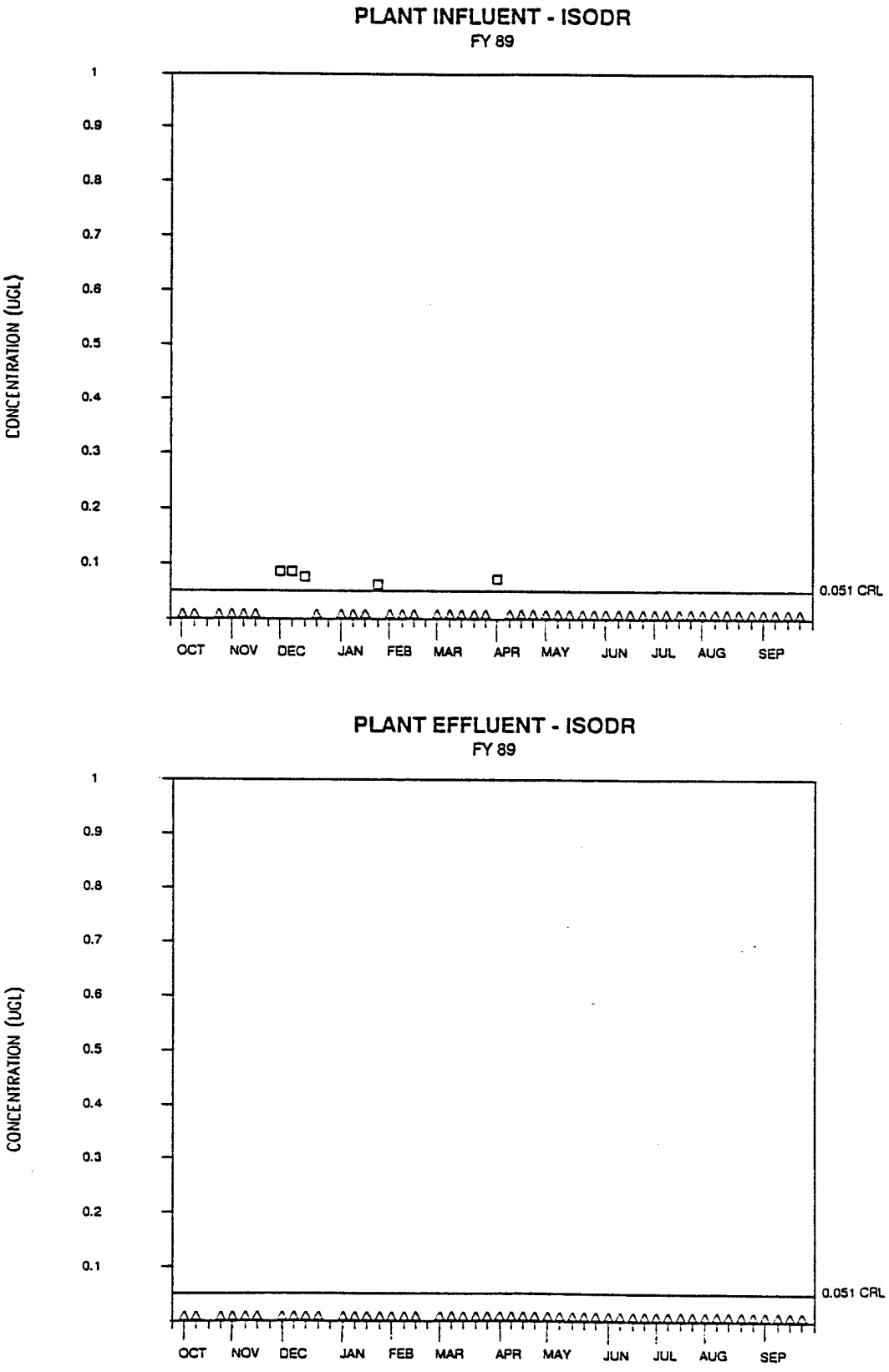
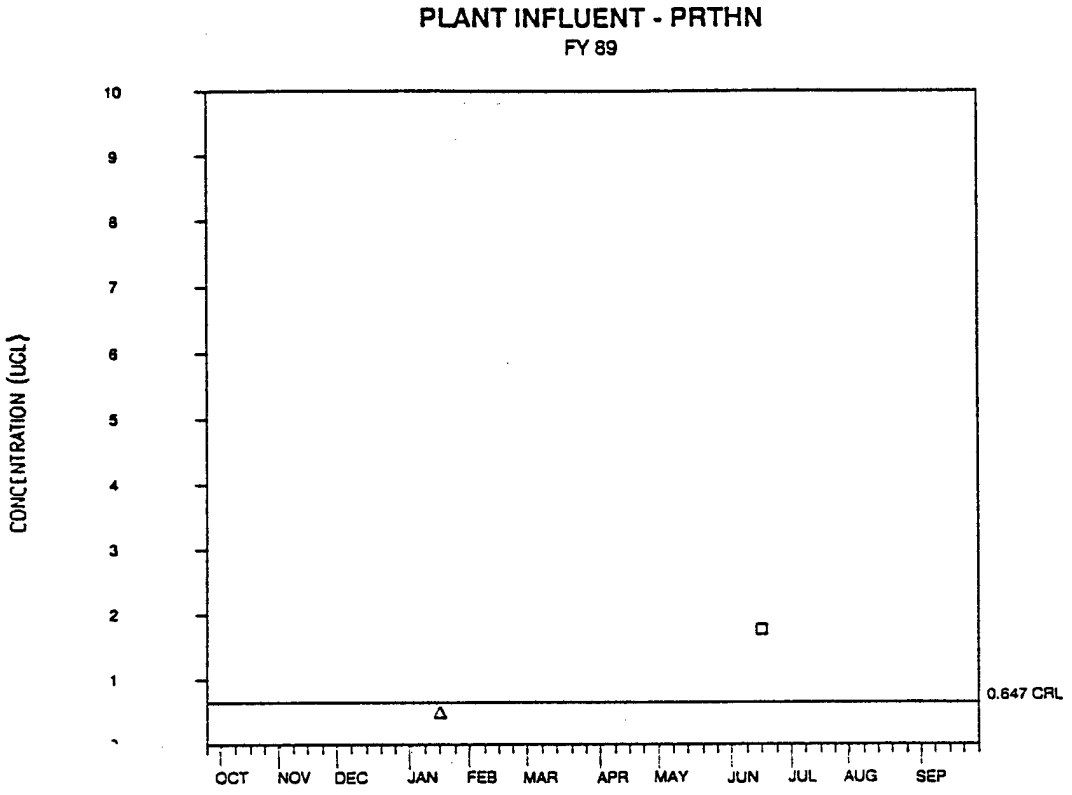


Figure 13. FY89 Isodrin concentrations



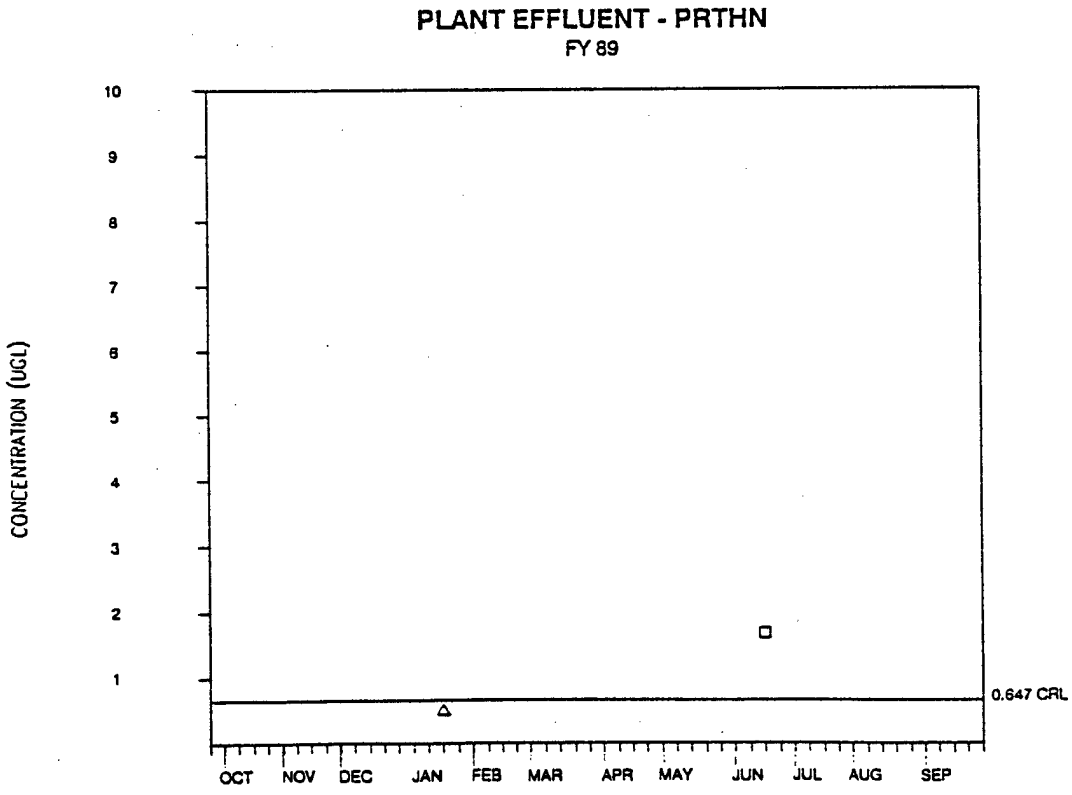


Figure 14. FY89 Parathion concentrations

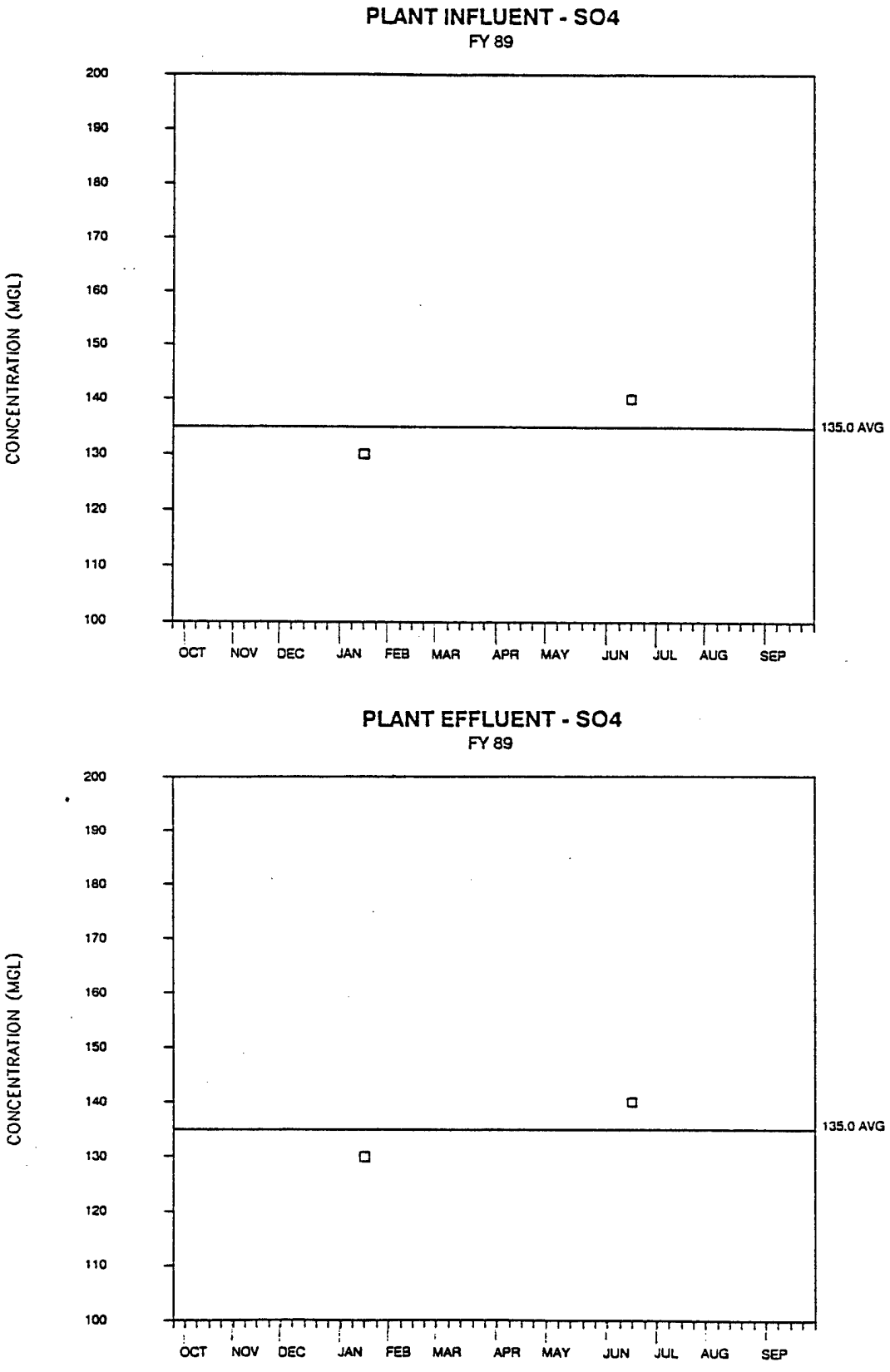


Figure 15. FY89 Sulfate (S04) concentrations

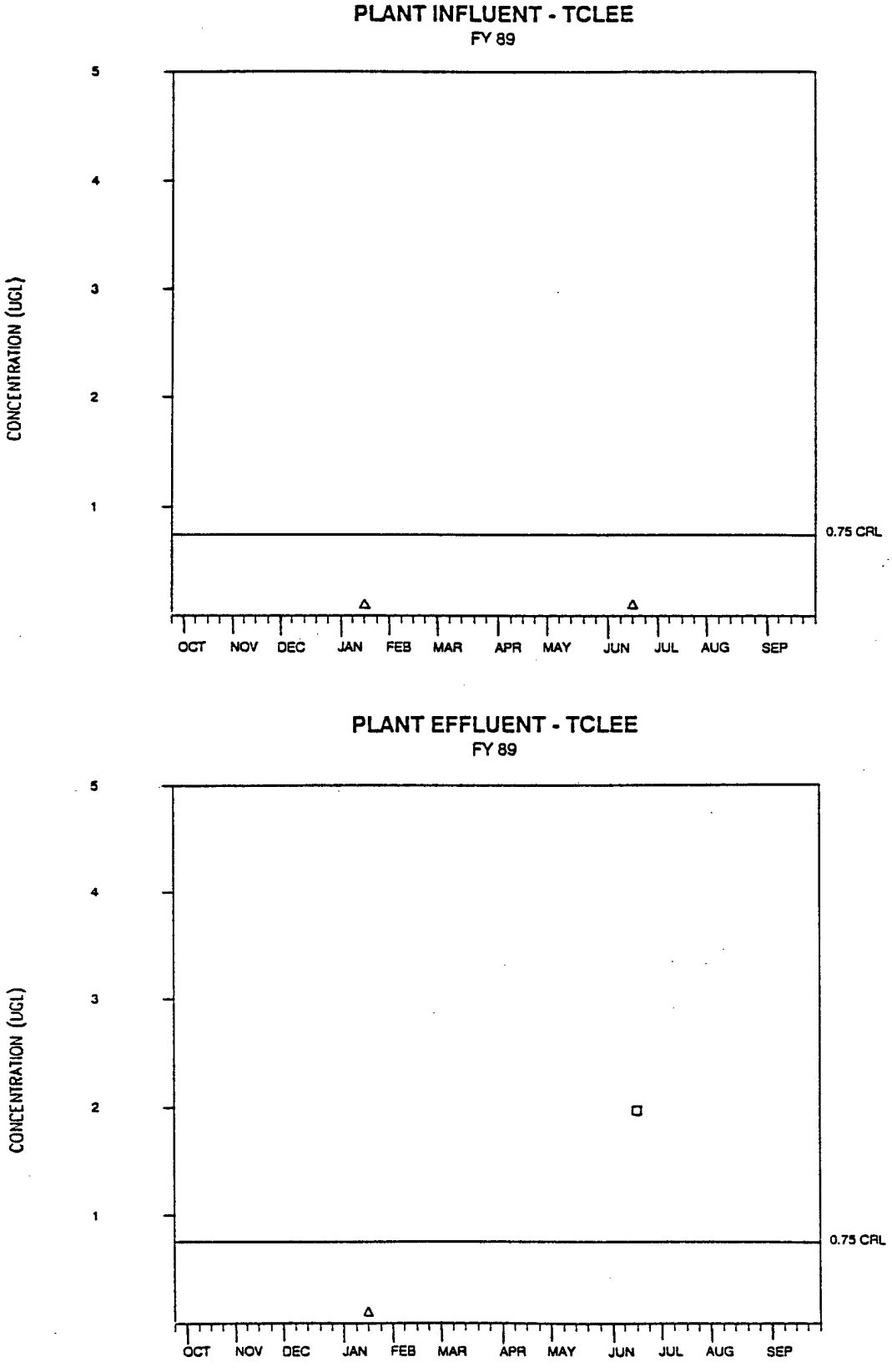


Figure 16. FY89 Tetrachloroethylene (TCLEE) concentrations

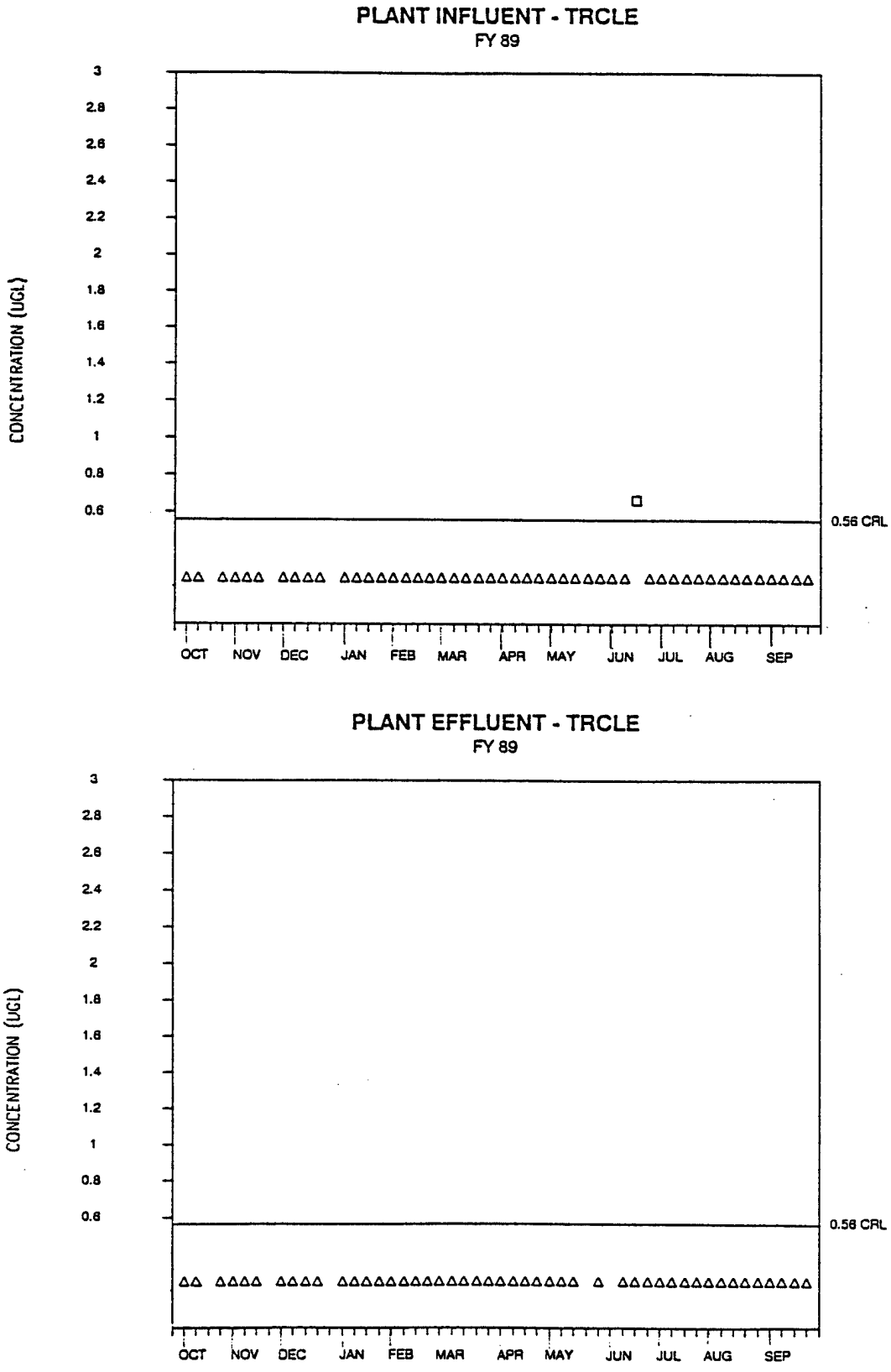


Figure 17. FY89 Trichloroethylene (TRCLE) concentrations

GS/MS Analysis

30. GC/MS analyses were conducted on influent and effluent samples collected in June, 1989. The results of the analysis are presented in Appendix B. No concentrations of contaminants above their respective detection levels were reported in either the influent or effluent sample.

Summary of System Water Quality Data

31. The NWBS treatment plant was generally successful in removing organic contaminants from the ground water treated during FY89. Of the organics analyzed for on a weekly basis, only DIMP was routinely found in the plant effluent at concentrations above the CRL. The DIMP concentrations were two orders of magnitude below the MOL with the exception of one sample collected in July 1989. The result reported for that date is considered anomalous. Several effluent samples collected during the year were found to contain aldrin and dieldrin concentrations in excess of their respective CRL's, however all the concentrations were below their respective MOL's.

32. Of the organics analyzed for only once or twice a year, chloroform, parathion, and tetrachloroethylene were found in effluent samples above their respective CRL's. Due to the limited number of samples collected, it is difficult to determine whether the CRL's are exceeded routinely or only occasionally. Analysis of more samples for these contaminants are needed over the year in order to determine realistic average effluent concentrations.

Contaminant Mass Removal

33. A calculation of the total mass of contaminants removed by the NWBS treatment system during FY87, FY 88, and FY89 was conducted by the Technical Operations Division as part of a multi-year study on all the water treatment systems in operation at RMA. A summary of the results from this study for the NWBS is present in Table 5. The amount of contaminants removed is given in pounds with a total for FY87, FY88, and FY89 of approximately 16, 18, and 3 pounds respectively. The contaminants with the largest amounts removed include chloroform, dicyclopentadiene, and dieldrin. The calculations were conducted using a simple mass balance. Average annual effluent concentrations were subtracted from average influent concentrations. Values less than the detection limits on CRL were treated as zero. The calculated values vary between years depending primarily on the average influent concentrations of the contaminants.

Table 5

Northwest Boundary System Contaminant Removal, FY87-FY89

Contaminant	Abbreviation	Pounds Removed FY87	FY88	FY89
Choloroform	CHCL3	9.95	14.04	1.78
Combined Organo-Sulfur	CPMSOX	0.00	1.15	0.00
Dibromochloropropane	DBCP	0.01	0.00	0.00
Dicyclopentadiene	DCPD	2.88	1.56	0.00
Dieldrin	DLDRN	0.68	0.79	1.47
Tetrachlorocthylene	TCLEE	1.21	0.00	0.00
Trichloroethylene	TRCLE	1.06	0.00	0.05
Other Organics		0.15	0.06	0.12
	TOTALS	15.93	17.60	3.42

Carbon Usage

34. Carbon usage in the NWBS treatment plant is very low compared to the North Boundary System treatment plant, due to the lower total mass of contamination being removed. No carbon was added to any of the adsorbers during FY89.

Contaminant Concentrations in Dewatering Wells

35. In order to provide a picture of the distribution of contaminants in the ground water near the NWBS, contaminant concentrations found associated with each alluvial dewatering well were plotted with respect to the well number along the dewatering well line. Thus, each graph provides a visual representation of a particular contaminants distribution along the length of the system. Based on the availability of data, graphs were developed only for aldrin, chloride, DCPD, DIMP, dieldrin, endrin, fluoride, isodrin, and trichloroethylene for FY89. These graphs are presented in Figures 18 through 26. Each graph presents the data collected for each well during the year. The vertical lines associated with each well number represent the range of concentrations found (maximum and minimum) with the mean value for each well connected by a dotted line. A mean value was only computed for sets of

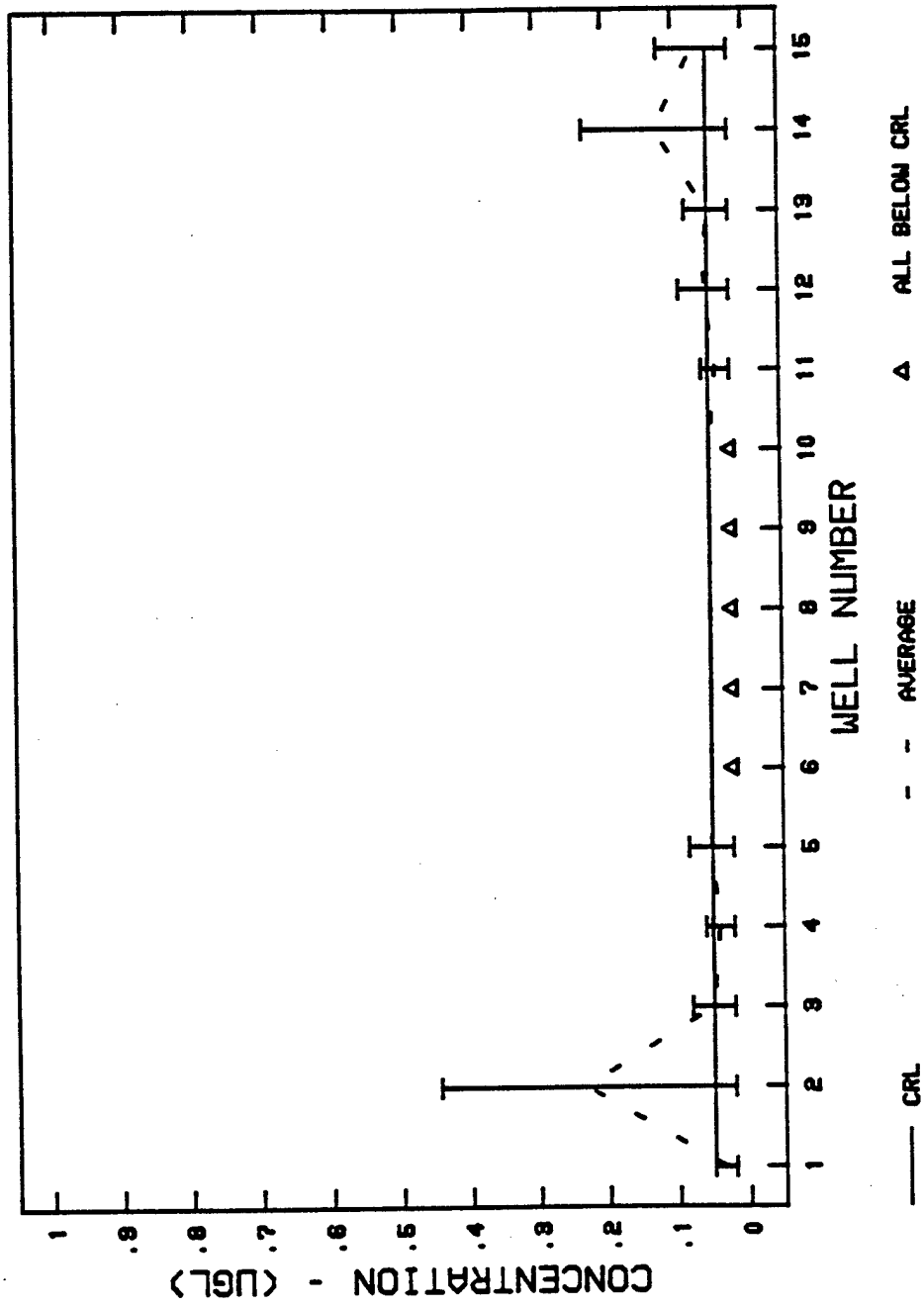


Figure 18. FY89 Aldrin concentration in NWBS dewatering wells

data where 70 percent or more of the readings were above the CRL. When this criterion was met, values falling below the detection limit were made equal to the detection limit or CRL and included in the computations. A single triangle indicates that all values were below the detection limit or CRL. A statistical summary of all the data used to develop the graphs is presented in Appendix C. It should be noted that the maximum number of samples collected from each well was five with only two samples collected in some cases.

Aldrin

36. During FY89, concentration of aldrin (Figure 18) above the CRL were found in samples collected from dewatering wells on the northeast and southwest ends of the control system. The maximum concentration found on the southwest end was approximately 0.45 ppb in well No. 2. The maximum concentration found on the northeast end was approximately 0.22 ppb in well No. 14. No concentrations above the CRL were found associated with well No.'s 6 through 10. The distribution of aldrin along the dewatering well line in FY89 was somewhat similar to that found in FY88, however concentrations above the CRL were found associated with more wells on each end of the system. The concentrations of aldrin found in FY89 were somewhat higher than those reported in FY88.

Chloride

37. The highest concentrations of chloride (Figure 19) during FY89 were found along the northeast end of the control system with a maximum concentration of approximately 800 ppm found associated with well No. 14. The maximum mean concentration on the northeast end of the system was approximately 600 ppm. The chloride concentrations decreased from northeast to southwest along the system with concentrations in the 150 to 200 ppm range found in samples from the southwest end. The distribution of chloride along the dewatering well line in FY89 was very similar to that found in FY88. However, concentrations found in FY89 were somewhat lower than those reported in FY88.

DCPD

38. During FY89, concentrations of DCPD (Figure 20) above the CRL were found associated with well No.'s 2 and 3 with a maximum concentration of approximately 15 ppb reported for well No. 3. None of the other dewatering wells produced samples with DCPD concentrations above the CRL. No DCPD concentrations above the CRL were reported for the dewatering wells in FY88.

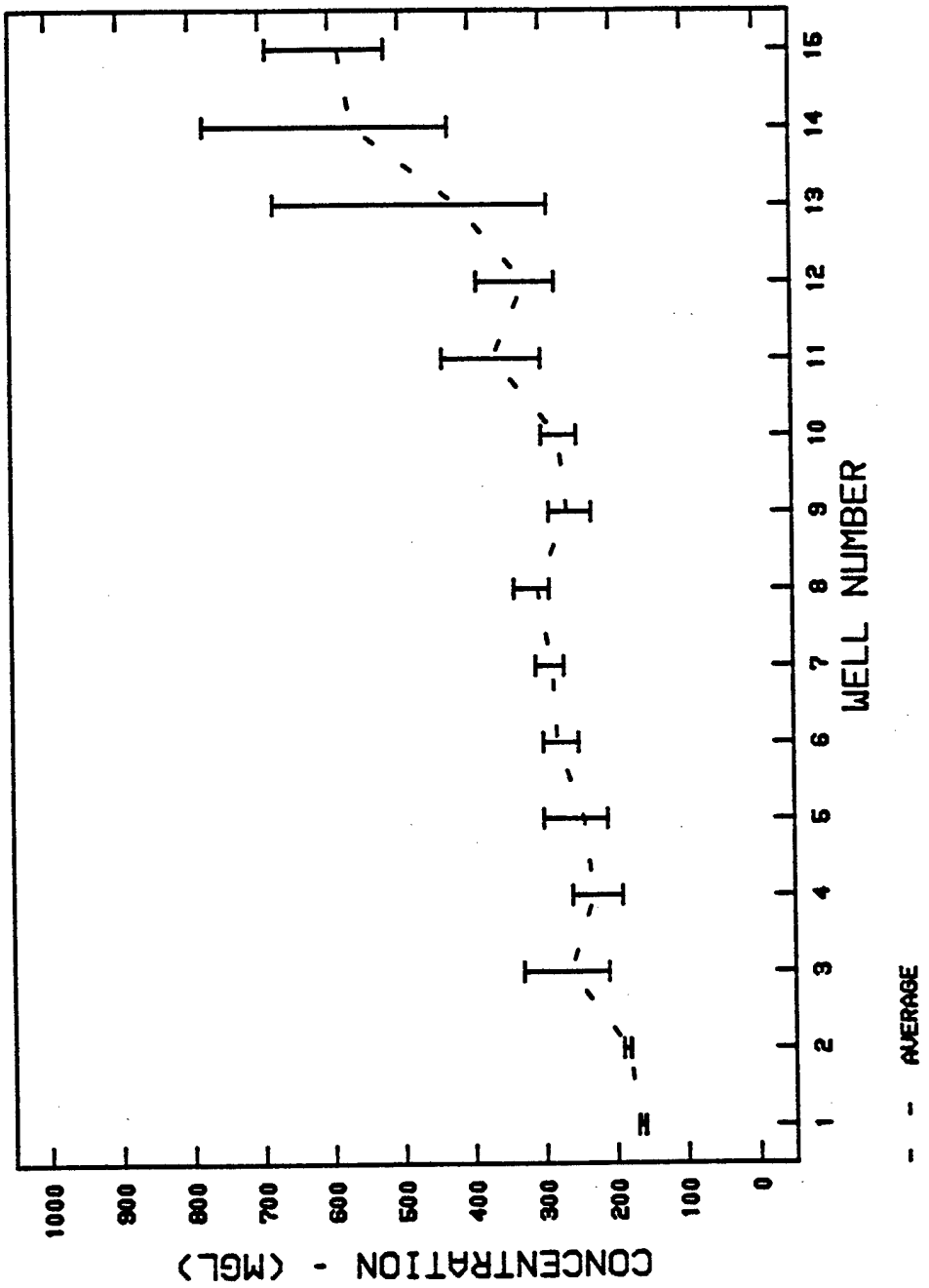


Figure 19. FY89 Chloride concentration in NWBS dewatering wells

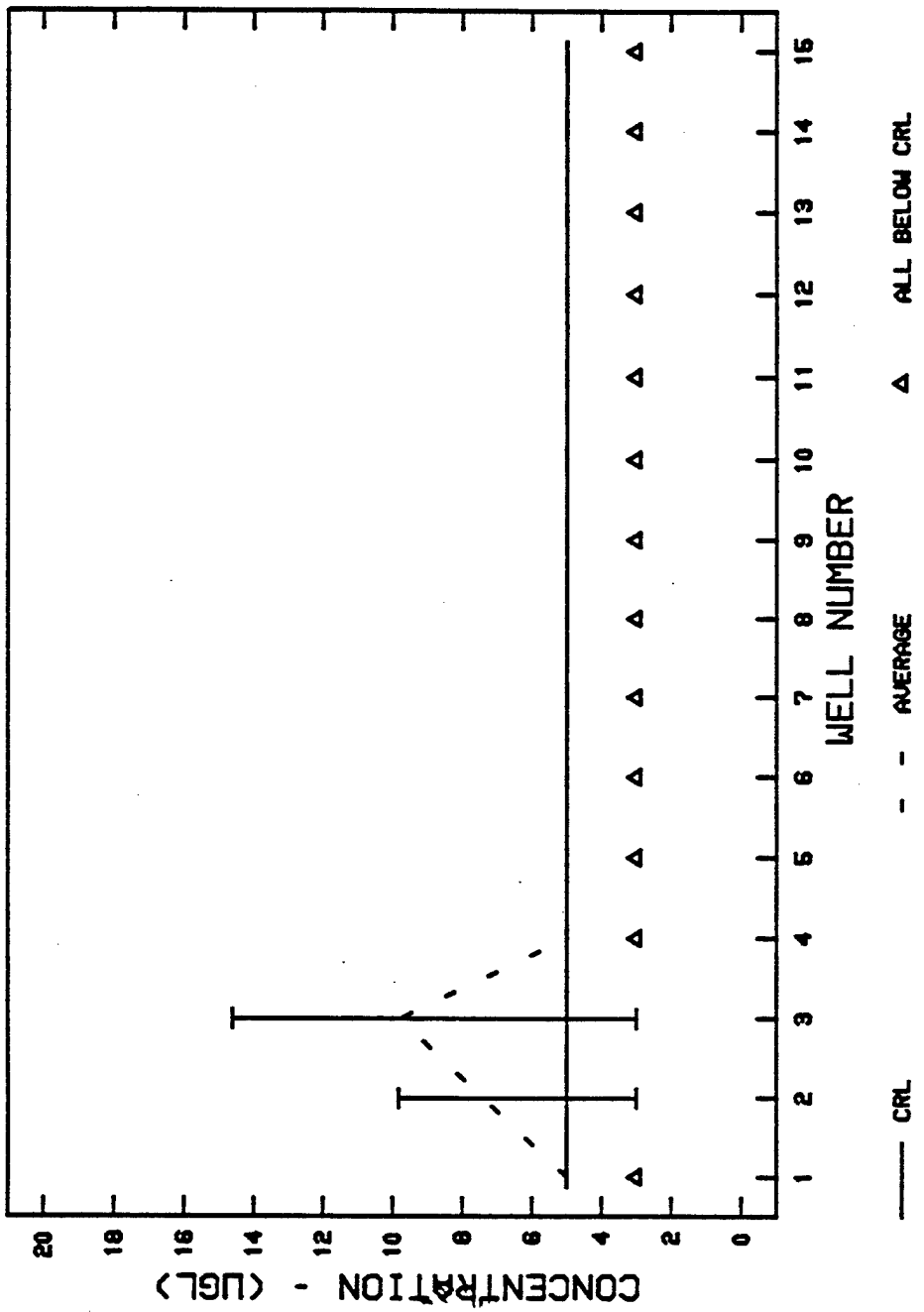


Figure 20. FY89 Dicyclopentadiene (DCPD) concentrations in NWBS dewatering wells

DIMP

39. During FY89, concentrations of DIMP (Figure 21) above the CRL were found in samples from all the dewatering wells except No.'s 1 and 2. The concentrations generally increased from southwest to northeast along the system with the highest concentrations reported for well No.'s 13 through 15. The mean concentration values along the line were generally less than 10 ppb. The distribution of DIMP along the dewatering well line in FY89 was some what similar to that found in FY88. The concentrations of DIMP reported in FY89 were lower along the northeast end of the system than those reported in FY88.

Dieldrin

40. During FY89, concentrations of dieldrin (Figure 22) above the CRL were found in samples from all the dewatering wells except No. 9. The concentrations were generally below 1 ppb with the exception of the northeast end of the dewatering well line where a maximum concentration of approximately 7 ppb was reported for well No. 13. The distribution of dieldrin along the system was very similar to that reported in FY88. The concentrations of dieldrin reported in FY89 were generally higher than those reported in FY88, particularly along the northeast end of the system.

Endrin

41. During FY89, concentrations of endrin (Figure 23) above the CRL were found in samples collected from dewatering wells on the northeast and southwest ends of the control system. The maximum concentration found on the southwest end was approximately 0.5 ppb in well No. 2. The maximum concentration found on the northeast end was approximately 0.2 ppb in well No. 14. No concentrations above the CRL were found associated with well No.'s 3 through 12 or with well No. 1. Only one endrin concentration above the CRL (in well No. 6) was reported for the dewatering wells in FY88.

Fluoride

42. In FY89, a general increasing trend in fluoride concentration was found from the southwest to the northeast end of the system (Figure 24). A maximum concentration of fluoride of approximately 5 ppm was reported for well No.'s 8, 13 and 15. The average concentrations found associated with the wells generally ranged from 1.5 to 4 ppm. The distribution and concentrations of fluoride found in FY89 did not vary significantly from those found in FY88.

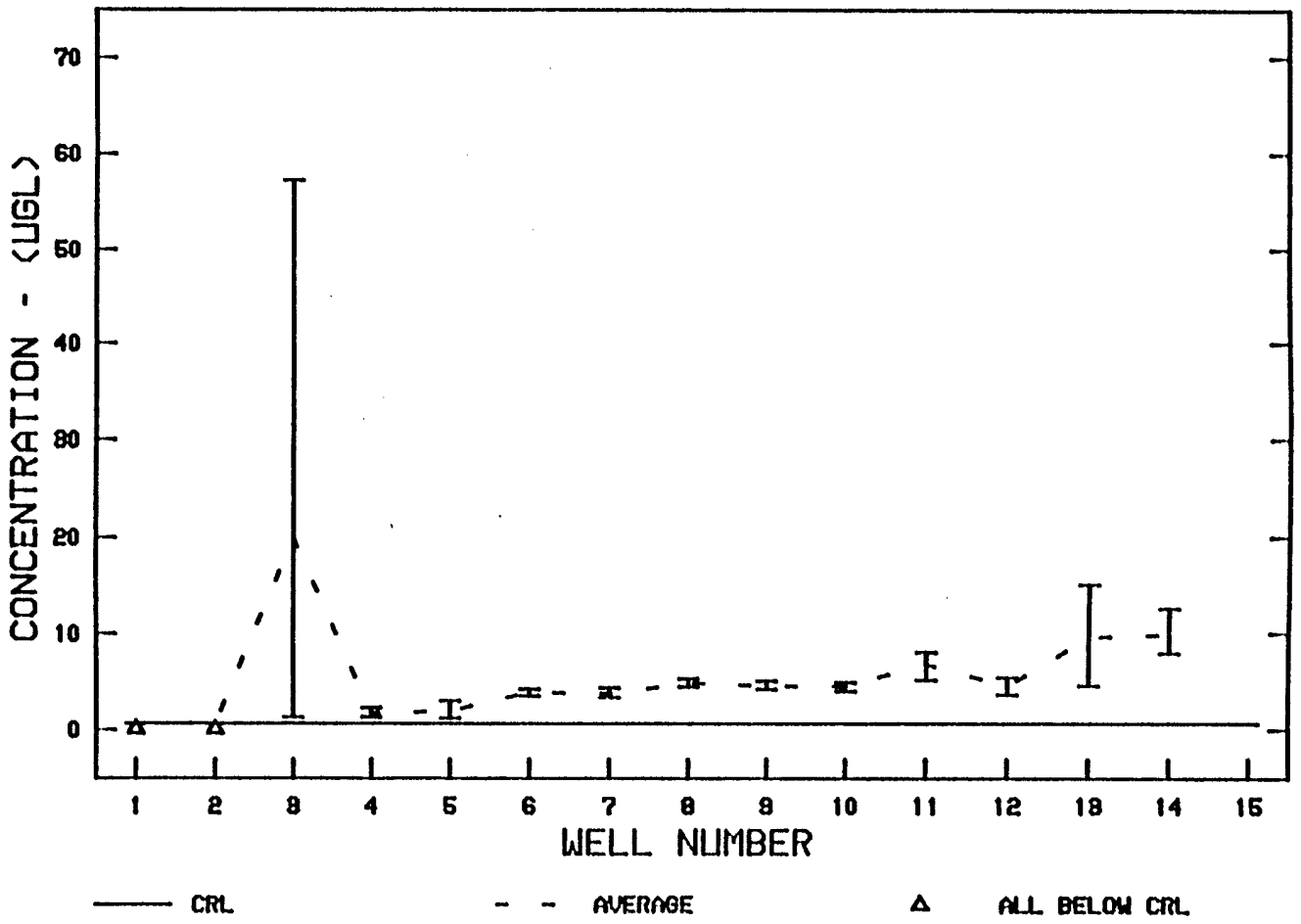


Figure 21. FY89 Diisopropylmethylphosphonate (DIMP) concentrations in NWBS dewatering wells

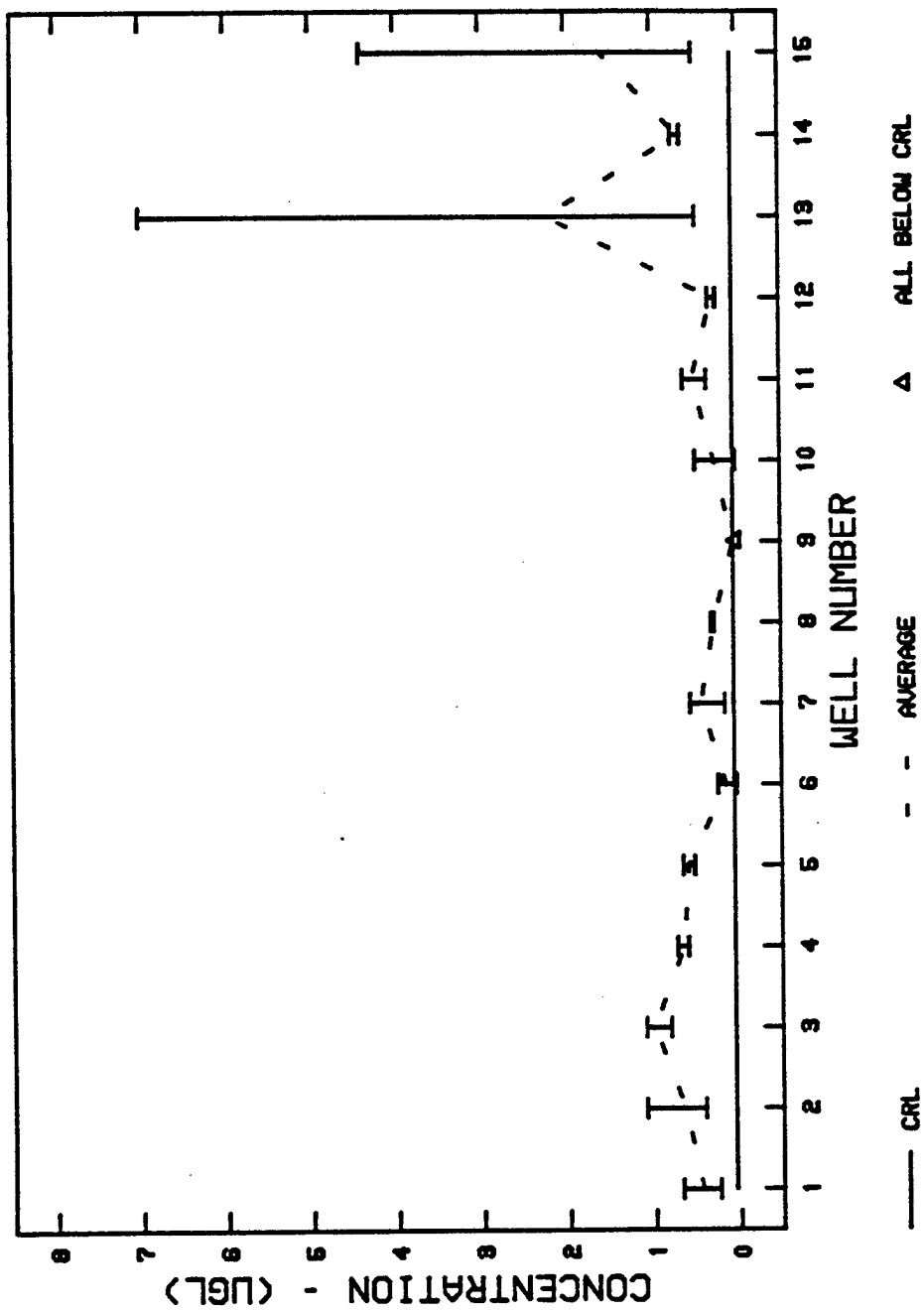


Figure 22. FY89 Dieldrin concentration in NWBS dewatering wells

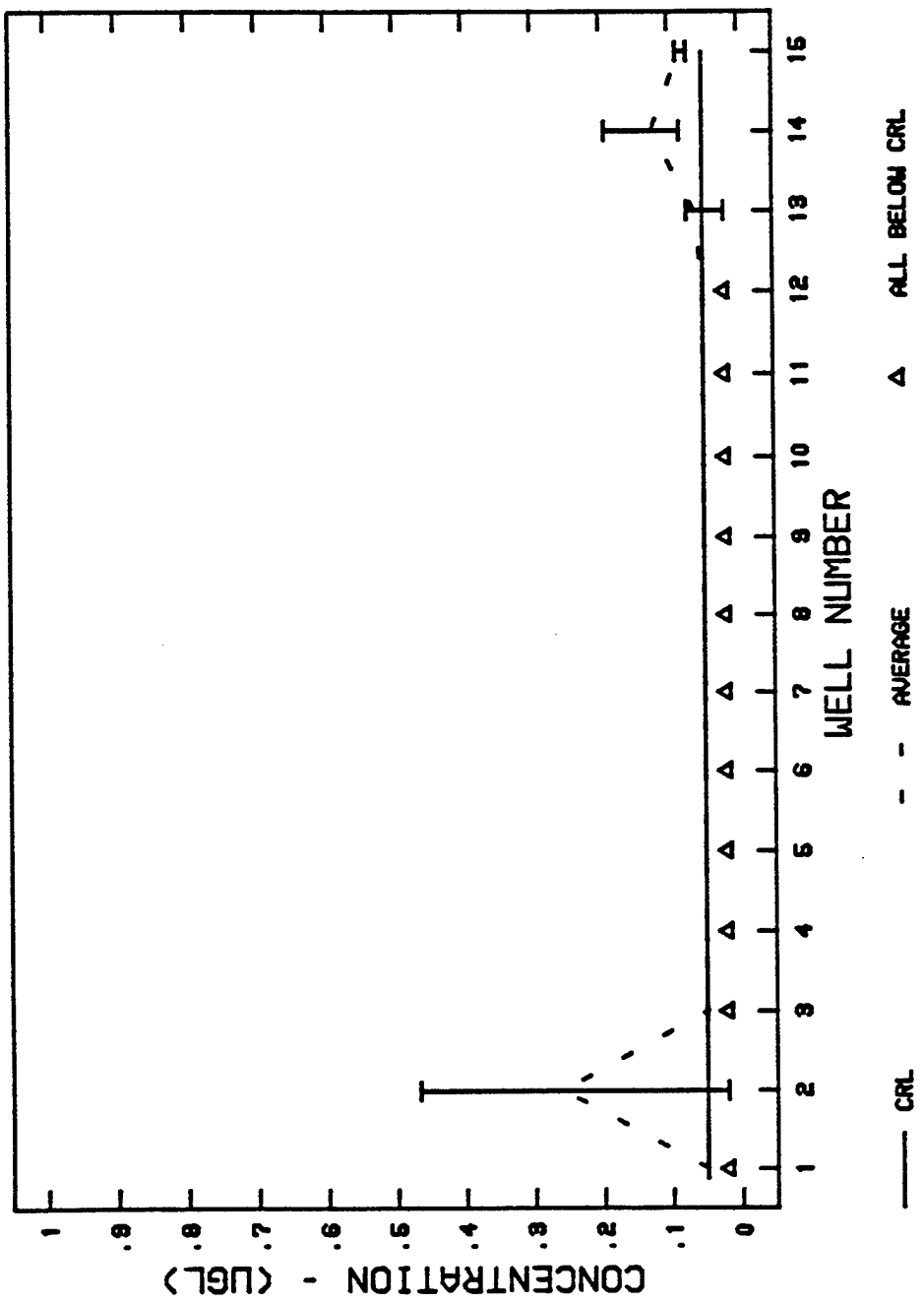


Figure 23. FY89 Endrin concentrations in NWBS dewatering wells

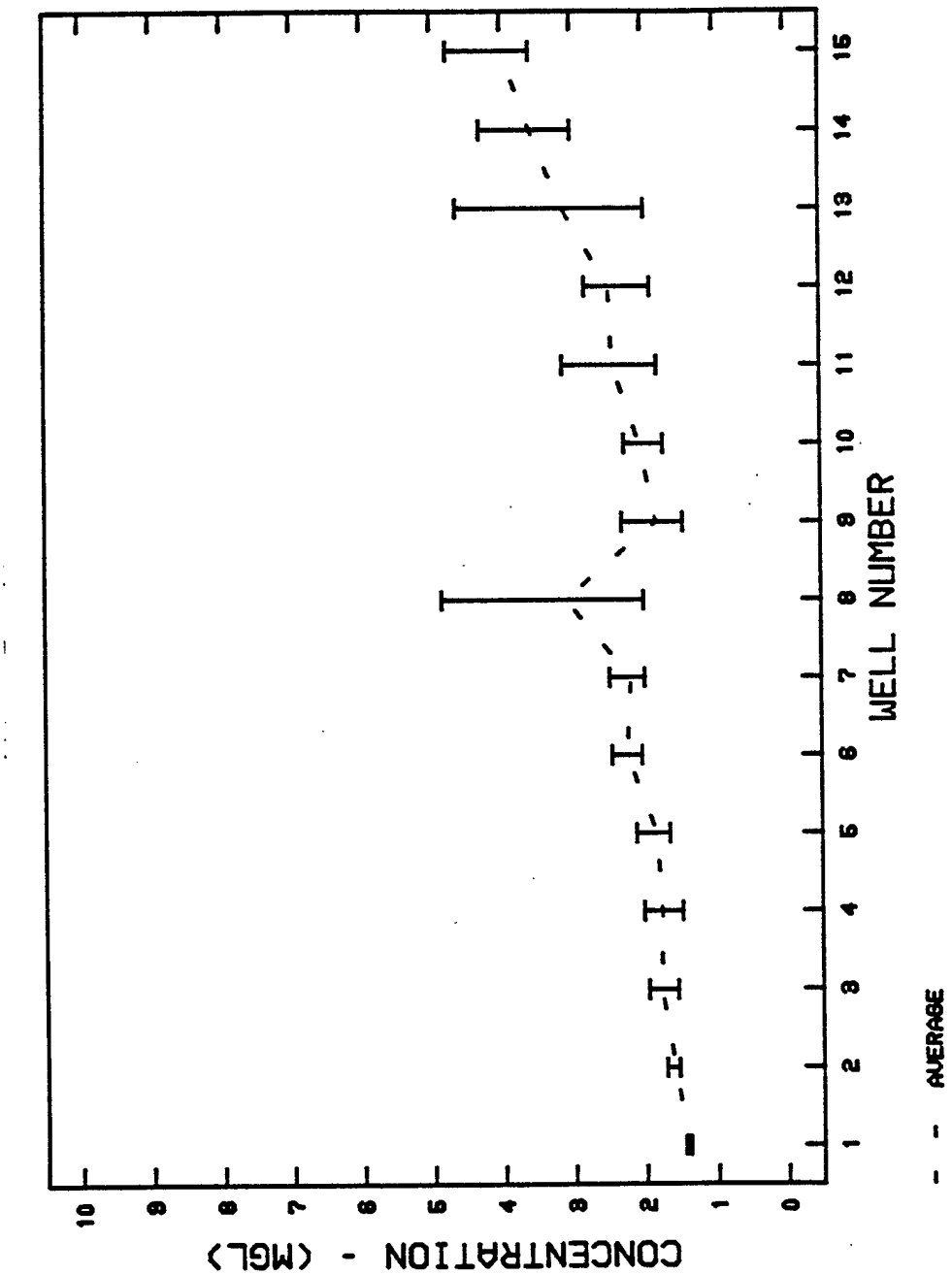


Figure 24. FY89 Fluoride concentrations in NWBS dewatering wells

Isodrin

43. During FY89, concentrations of isodrin (Figure 25) above the CRL were found in samples collected from wells located generally along the northeast half of the system. A maximum concentration of approximately 0.65 ppb was reported for well No. 10. Isodrin concentrations along the southwest end of the line were generally below the CRL. No isodrin concentrations were reported for the dewatering wells in FY88.

Trichloroethylene

44. During FY89, concentrations of trichloroethylene (Figure 26) above the CRL were found in samples collected from wells located along the northeast end of the system. A maximum concentration of approximately 1.4 ppb was reported for well No. 14. Trichloroethylene concentrations were reported to be below the CRL for well No.'s 1 through 10 and No. 12. No trichloroethylene concentrations were reported for the dewatering wells in FY88.

Summary of Dewatering Well Data

45. Based on the contaminant concentration data collected for the dewatering wells during FY89, it appears that the highest concentrations of aldrin, DCPD, dieldrin, endrin, isodrin, and trichloroethylene were found along either or both ends of the dewatering well line with essentially no concentrations above their respective CRL's found along the center of the line. With respect to chloride, DIMP, and fluoride, the concentrations increased from southwest to northeast along the line. Of those contaminants for which values were not reported in FY88, isodrin and trichloroethylene concentrations above their respective CRL's with wells along the northeast end of the line while DCPD concentrations above the CRL were found along the southwest end of the line.

46. With respect to overall trends in the FY89 distributions of the individual contaminants reported in FY88, there was not a lot of change. However, additional contaminants with concentrations above their respective CRL's have been found on both ends of the system. With respect to FY89 concentrations of contaminants reported in FY88, fluoride remained about the same while aldrin, and dieldrin concentrations increased slightly. Chloride and DIMP concentrations decreased somewhat.

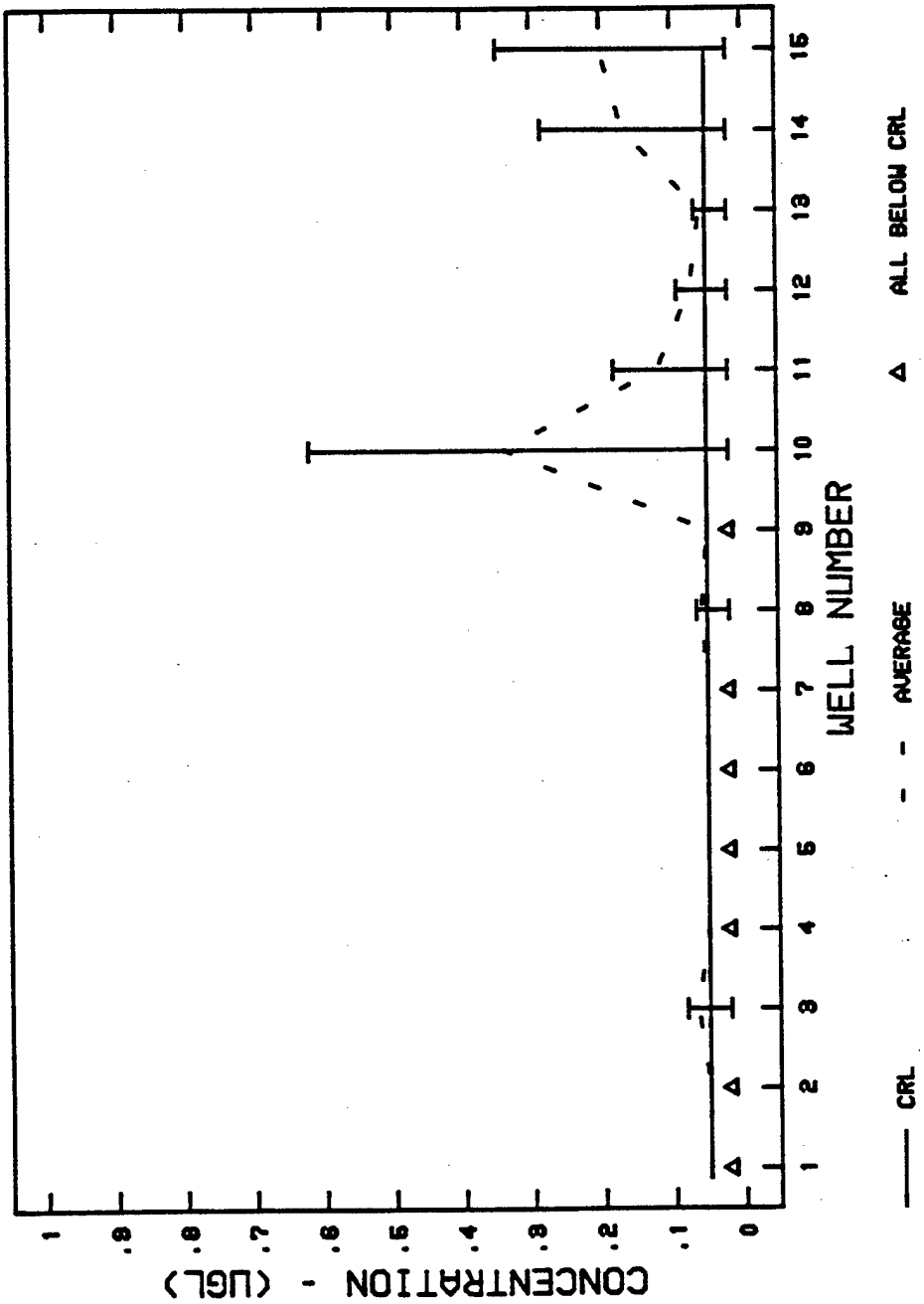


Figure 25. FY89 Isodrin concentrations in NWBS dewatering wells

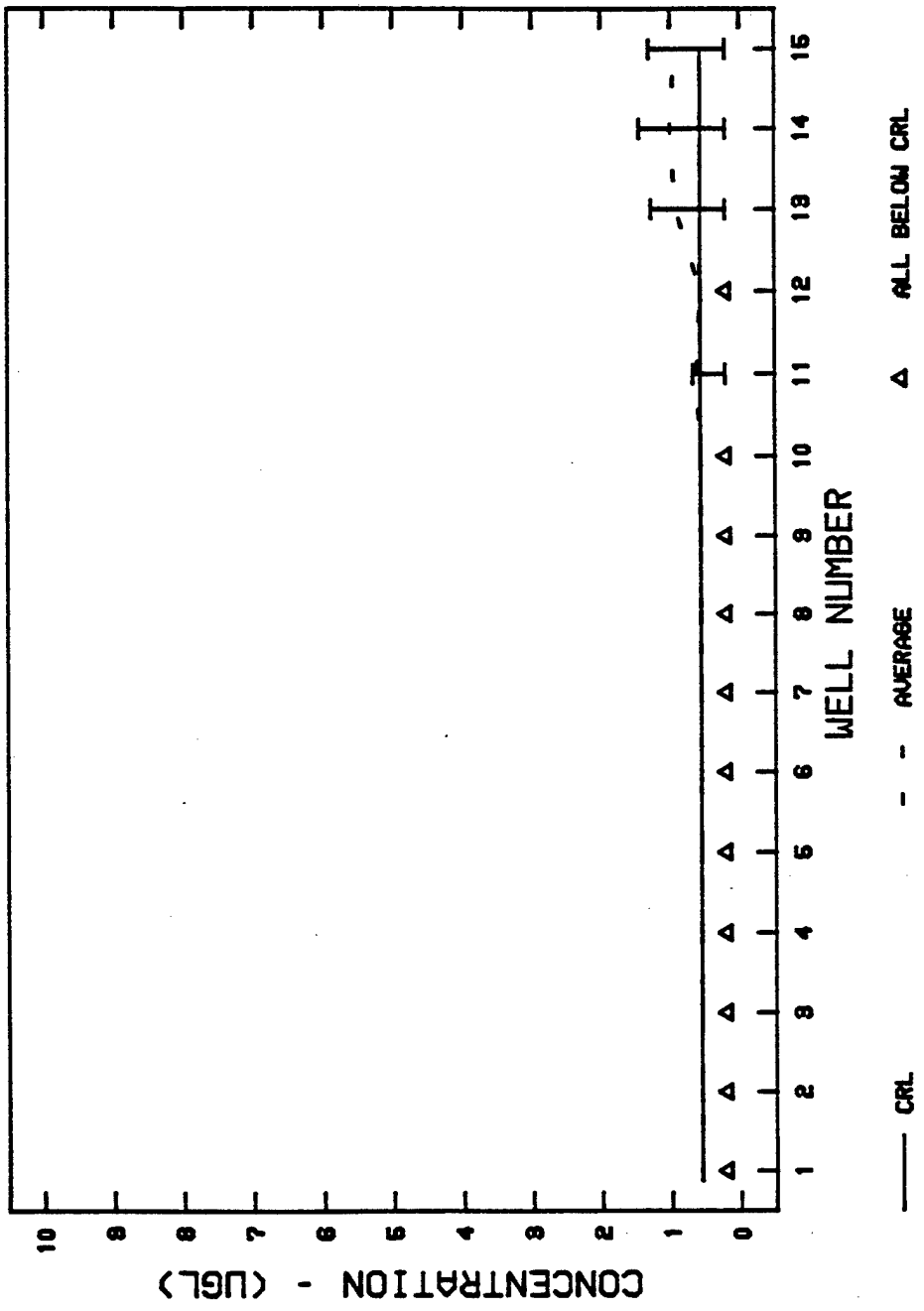


Figure 26. FY89 Trichloroethylene (TRCLE) concentrations in NWBS dewatering wells

PART IV: GROUND-WATER FLOW EVALUATION

Geology and Hydrogeology

Geological Setting

47. Description of the geology at the Northwest Boundary area has been presented adequately in previous assessment reports and is not repeated here.

Start of Year Alluvial Hydrogeology

48. Hydrogeological conditions in alluvium at the start of FY89 were in continuity with conditions for the past few years. Figure 27 shows the configuration of the water table in October 1988. The map is generated mostly by computer and is distinct in appearance from maps in previous years which were contoured by hand with geological interpretation.*

End of Year Alluvial Hydrogeology

49. Hydrogeological conditions in alluvium at the end of FY89 are shown in Figure 28. Readings on about October 13, 1989 are representative of the end of FY89 despite falling two weeks into FY90.

50. Comparison of the map for the end of the year with the map for the start of the year (Figure 27) reveals the major rise in water table that took place on both sides of the barrier. The rise is shown separately in Figure 29. Water continued to rise through most of the year as evident in the

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* The computer program for contouring entitled MCCON, was developed by the Geotechnical Laboratory, WES. The program is written in FORTRAN and operates on a PC ("286" or "386" IBM compatibles). MCCON is used to prepare contour maps and to prepare section profiles. The program will accept up to 999 data (x,y,z) triplets. MCCON was chosen for this project because it is capable of handling the discontinuous behavior of the water table in the vicinity of the slurry walls. The program generates non-intersecting triangles which connect each and every data (node) point. Triangle generation ceases after all of the nodes are used as a vertex of at least one triangle and the mesh of triangles encompasses all of the nodes in a convex fashion (i.e., the outer edges of the triangle mesh form a convex shape). The resulting mesh will contain no areas that are not included within a triangle (i.e., the mesh will contain no "holes"). Typically, a set of 100 nodes (on a "386" machine with math coprocessor and EGA card) will require 10 seconds to generate the triangle mesh; a set of 400 nodes, 56 seconds; and 900 nodes, 165 seconds. The time devoted to contour line drawing (on the screen) is typically an additional 20-30 seconds. The contour lines are drawn as a series of connecting straight line segments and circular segments. This combination yields an aesthetically pleasing appearance to the resulting contour map.

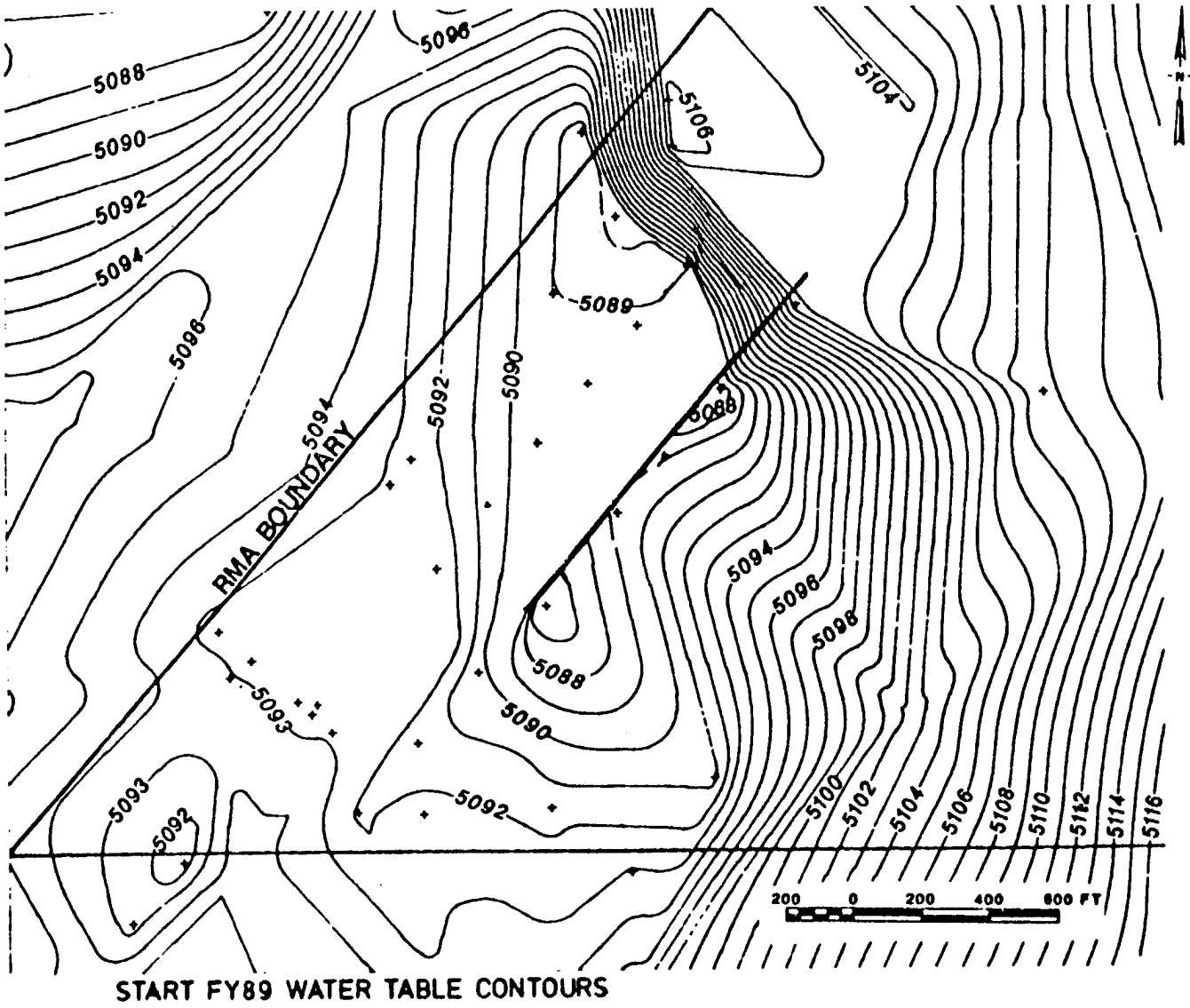

Figure 27. Water-table configuration (ft) at start of FY89

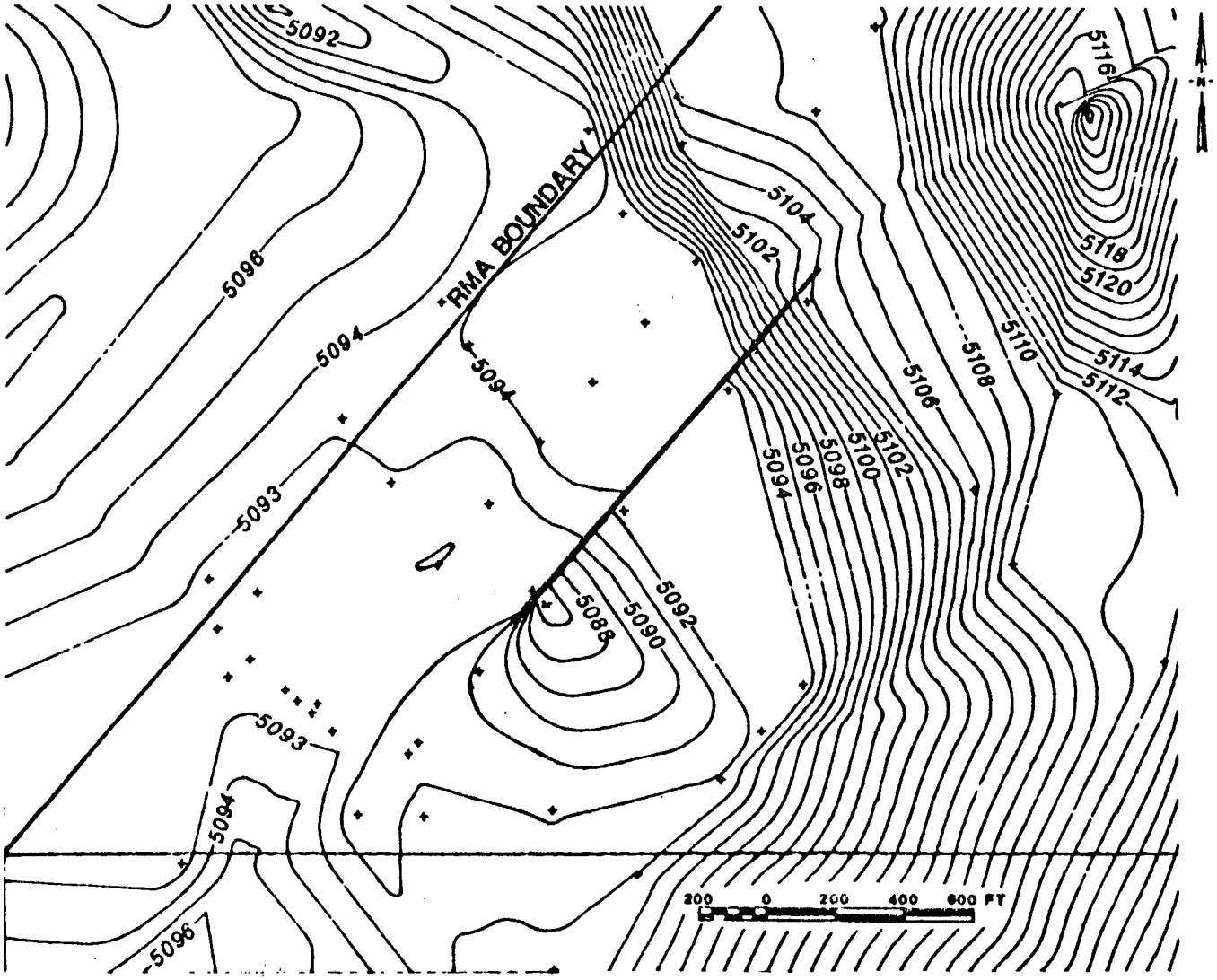

Figure 28, Water-table configuration (ft) at end of FY89

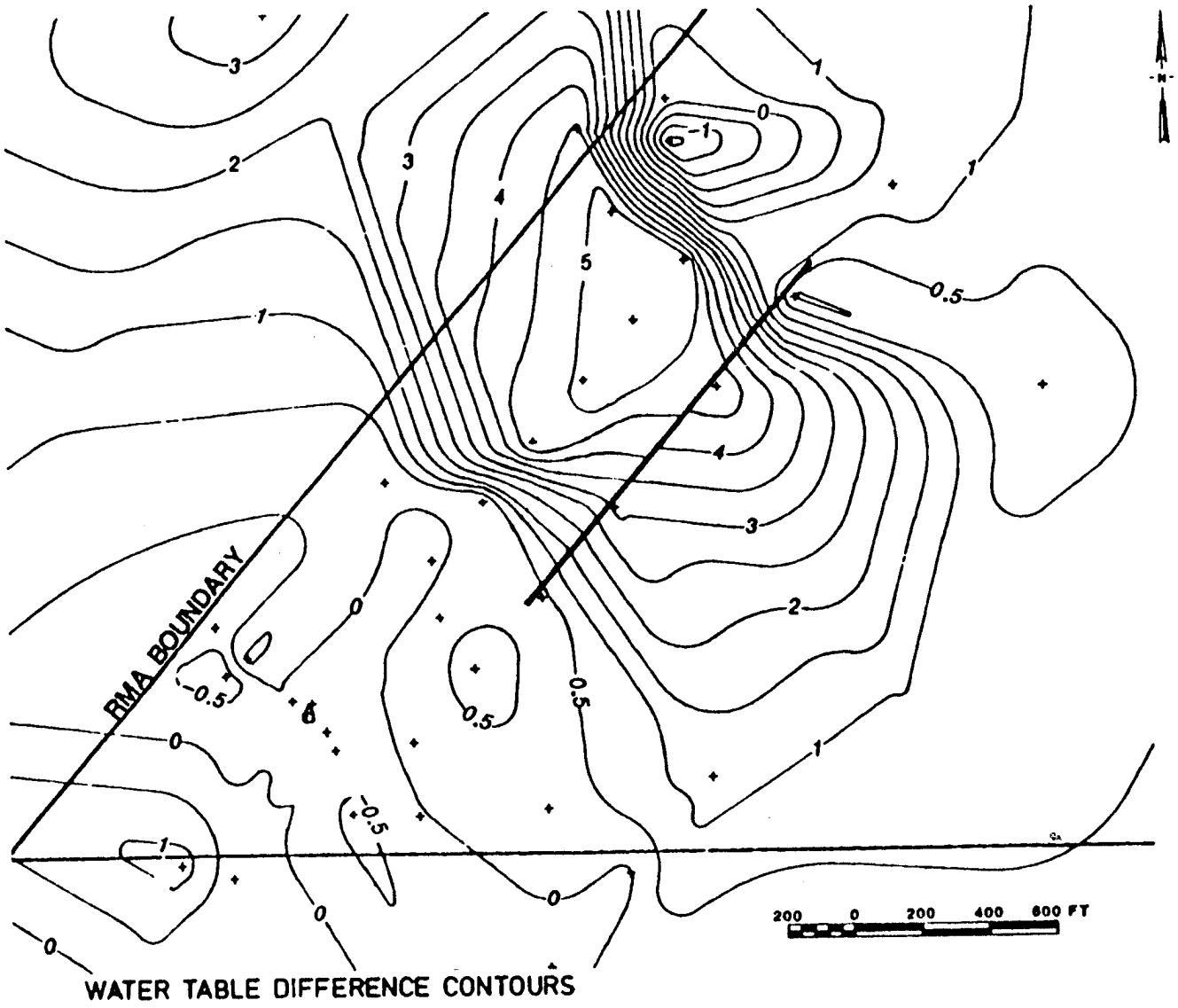

Figure 29. Water-table difference (ft) between start and end of FY89

rise of quarterly profiles among Figures 30 through 35. The rise was as great as 4 ft near the barrier as evident in Figures 34 and 35.

51. The rise in water table resulted from operational increases in flow rates and total flow to recharge wells at the northeast half of the system. This management action corrected a previously recognized condition of low water table immediately northwest of the barrier and associated unfavorable head gradient across the barrier. Contemporaneously, the water table rose substantially southeast of the barrier. The mounding of the water table resulting from the increased recharging impeded ground-water flow around the barrier and led to this buildup.

Denver Hydrogeology

52. Only a relatively few monitoring wells are screened in the Denver formation and these are further divided among at least three distinct aquifers. Accordingly no area-wide contouring of piezometric surfaces is meaningful as yet. A general parallelism between configurations in the Denver aquifers and in the alluvial aquifer has been established, but refinement must await the addition of more Denver monitoring wells.

Ground-water Hydrology

Long-Term Trend

53. Indications of a long-term decline in the water table were in accord with the decline indicated in the previous several years (TOD 1989). In Figure 31 the decline is evident among monitoring wells in Section 27 away from the influence of the NWBS. The range of levels for FY88 is shown for comparison. A similar decline is evident along profile 2 (Figure 32). The decline is not related to droughty conditions since annual precipitation has recently been above the average 15 in. as follows:

FY	Annual Precipitation (in.)
85	17.82
86	11.54
87	19.05
88	17.55
89	15.27

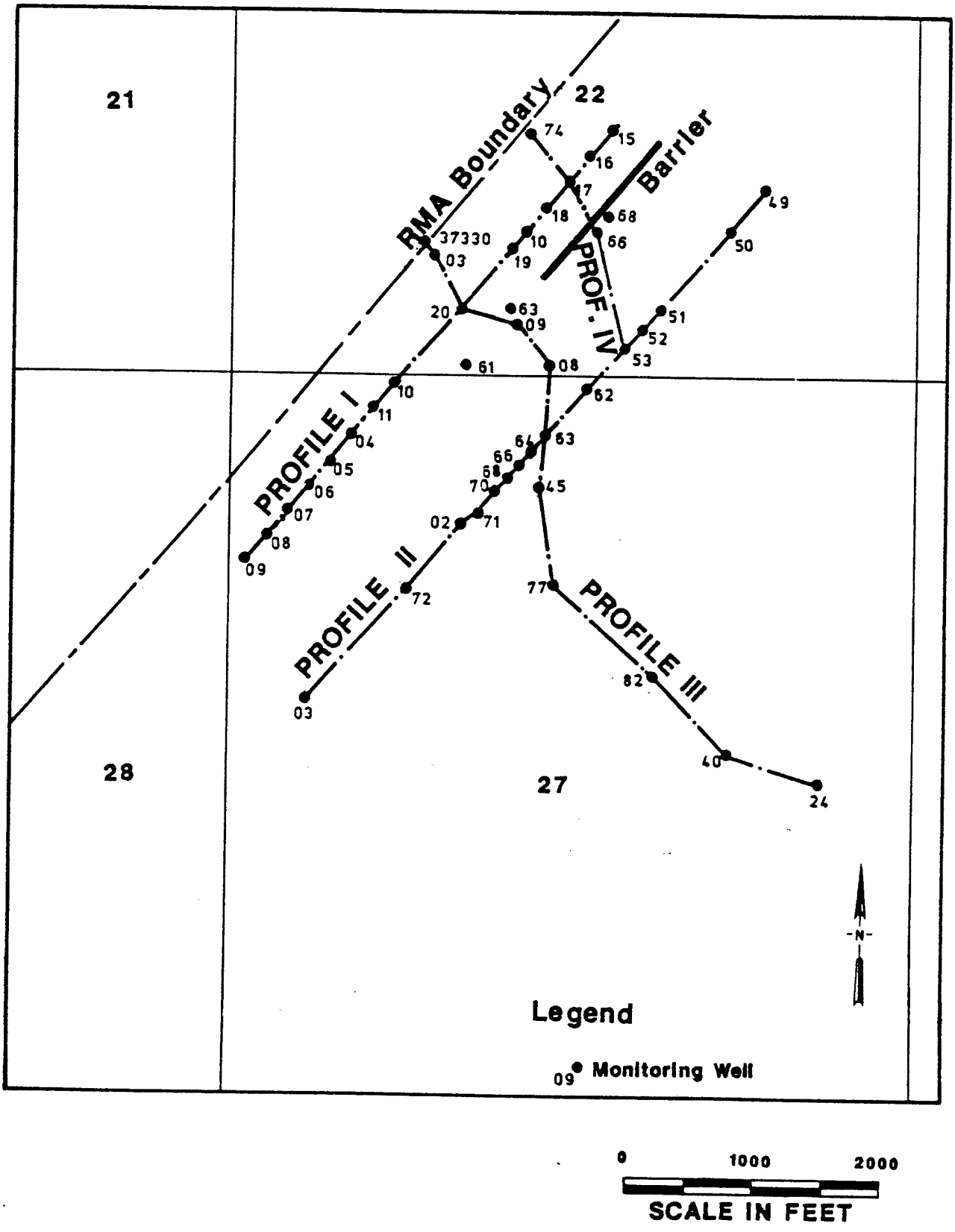

Figure 30. Locations of water-table profiles

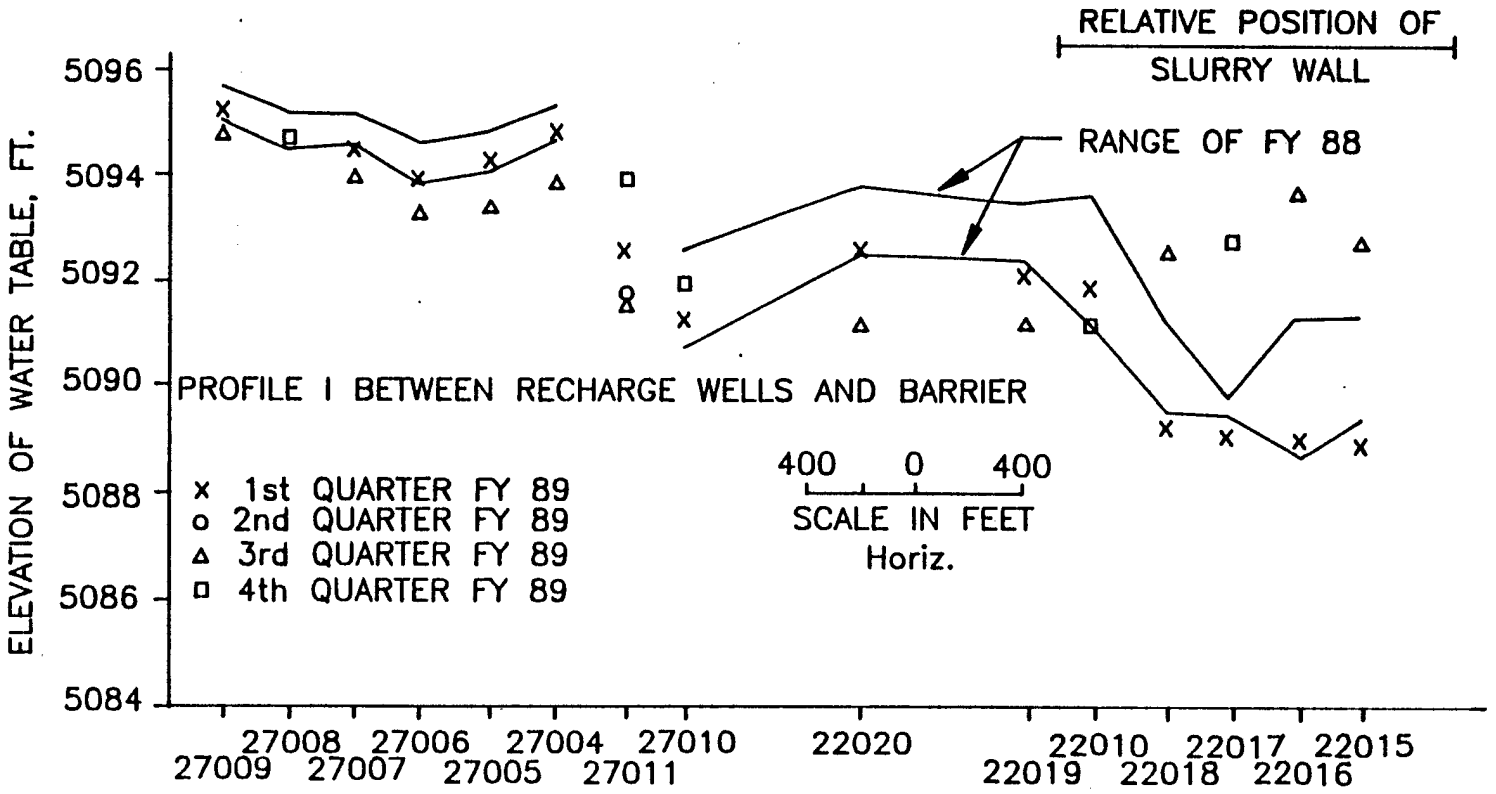

Figure 31. Profile I for FY 89

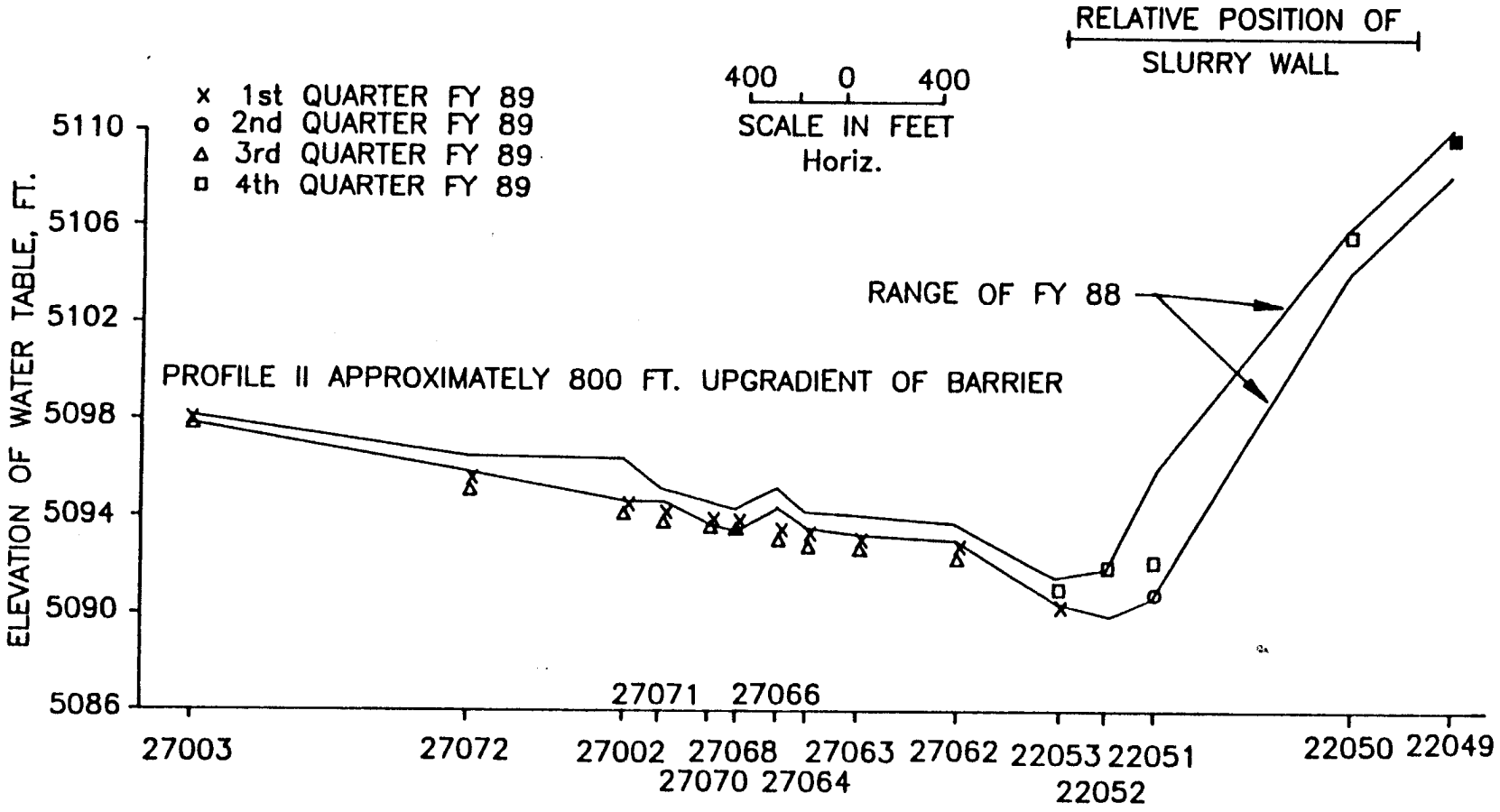

Figure 32. Profile II for FY 89

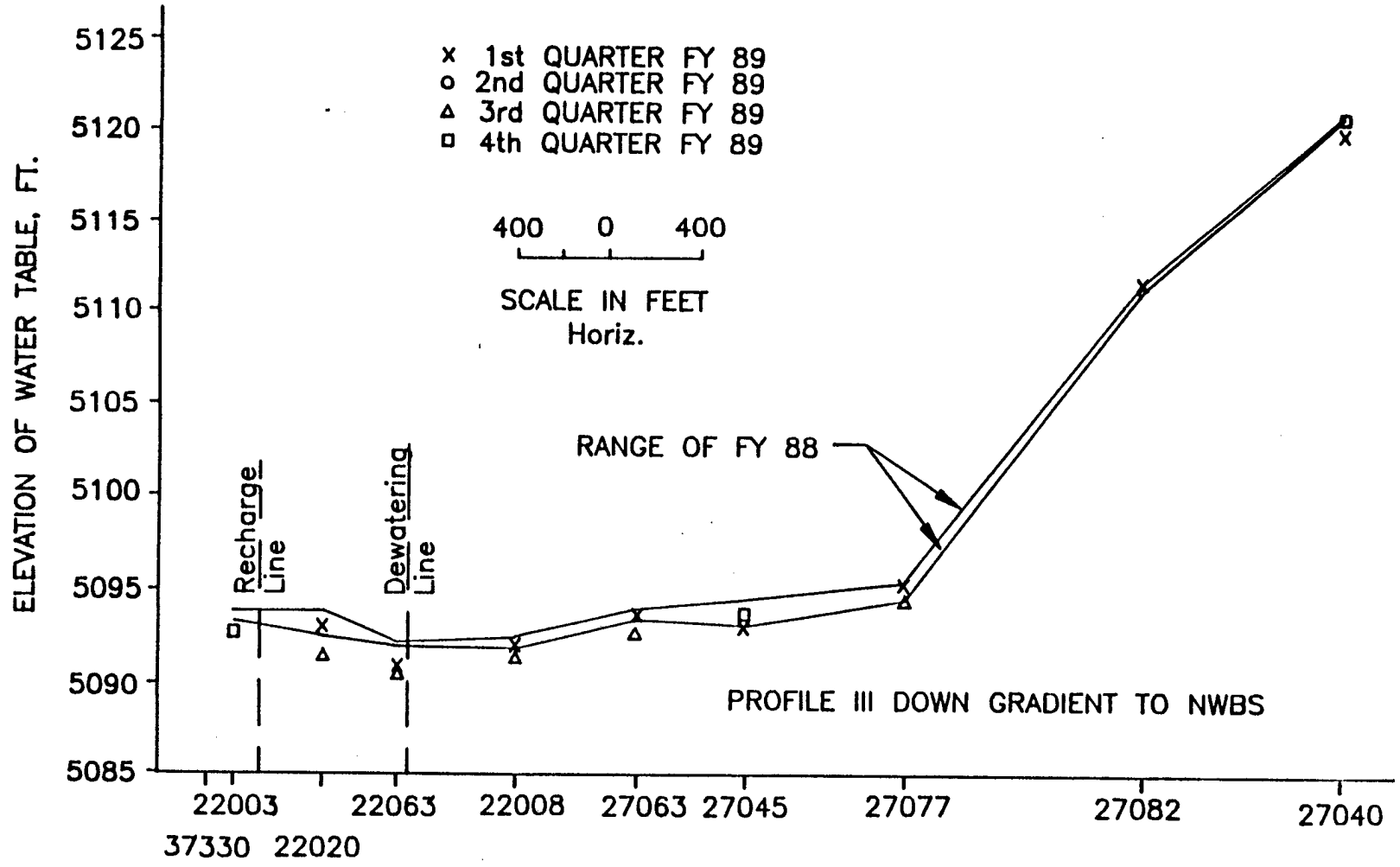

Figure 33. Profile III for FY 89

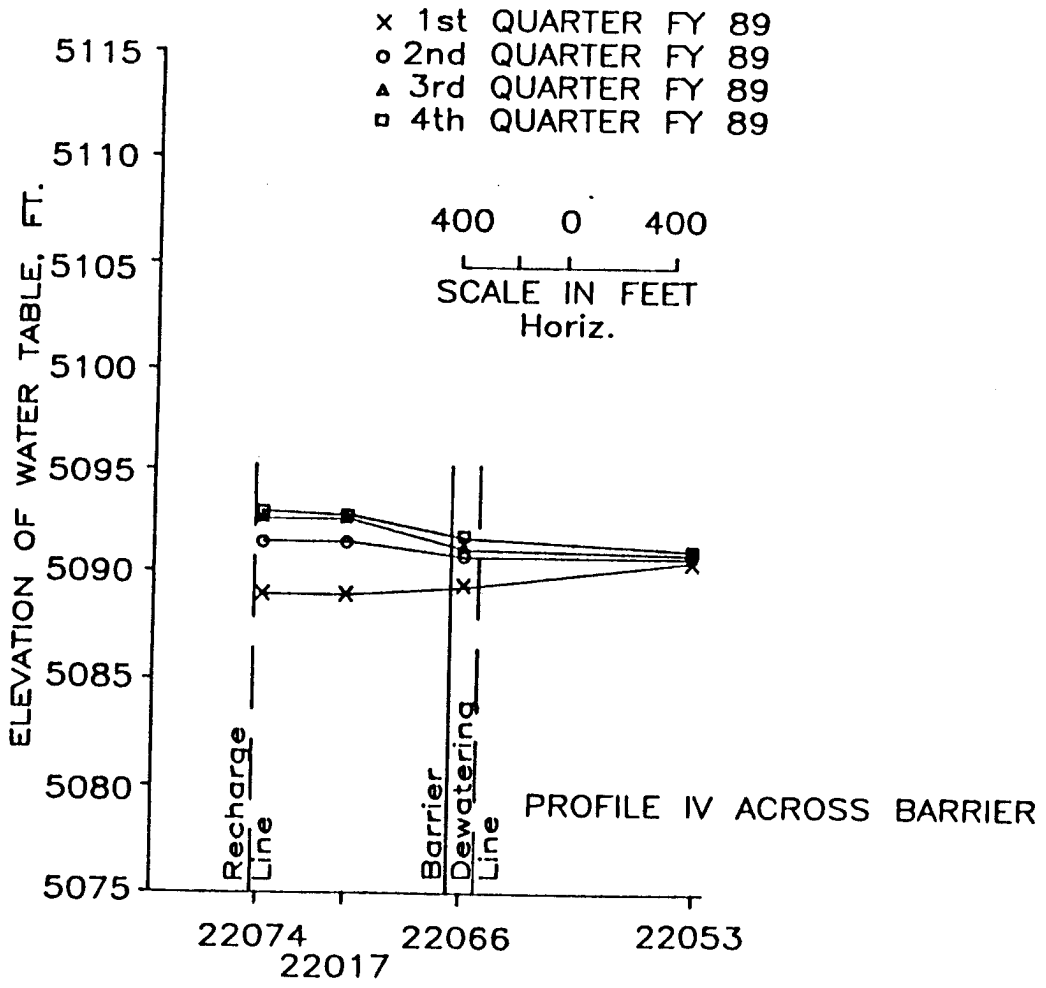

Figure 34. Profile IV for FY 89

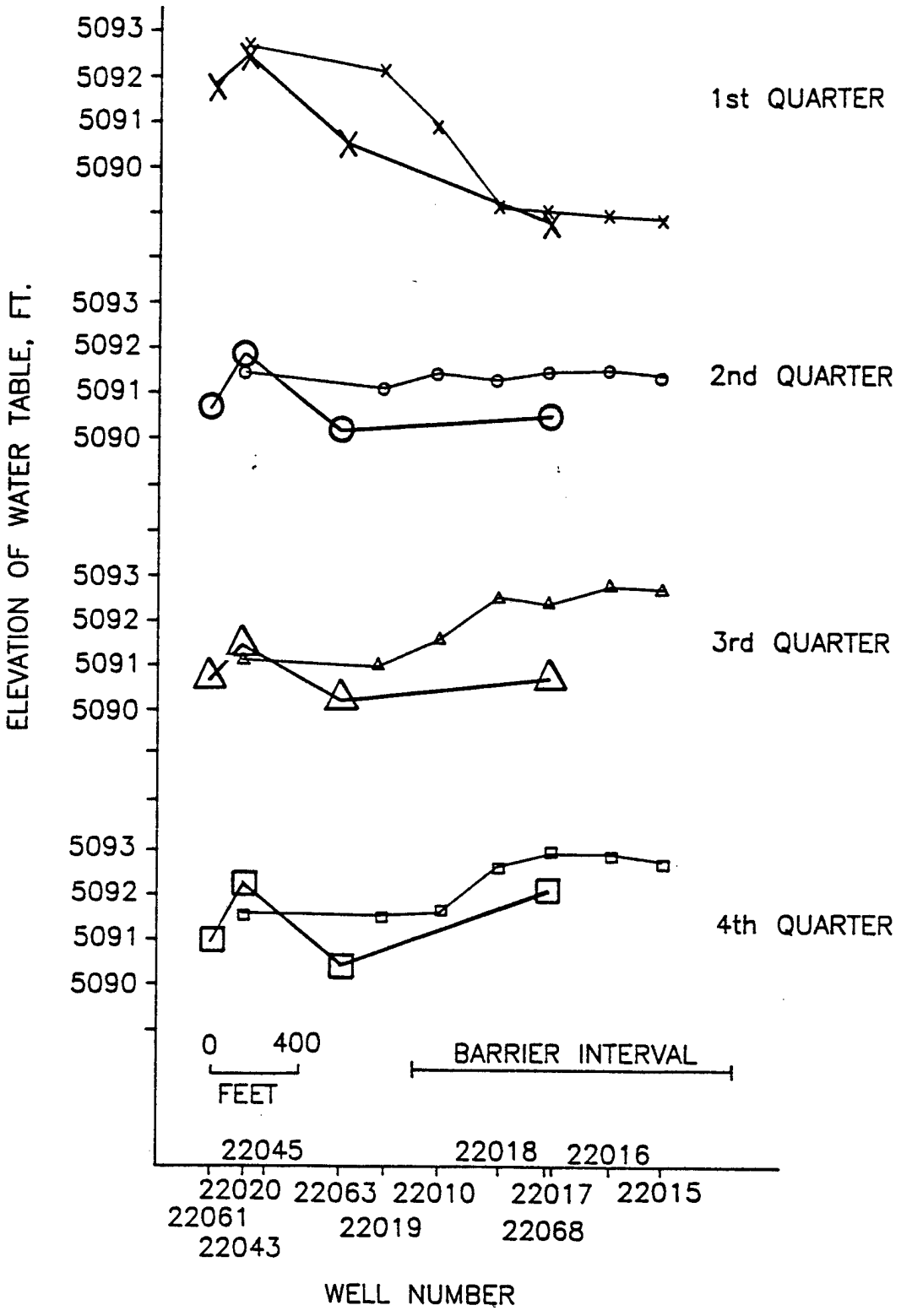

Figure 35. Comparison of ground-water levels on northwest side (light symbols) and southeast side (heavy symbols) of barrier

Seasonal Trend

54. Seasonal fluctuations are also evident in the behavior of the water table. Levels quarter by quarter are shown in Figures 31 through 33. Close examination reveals that the levels rose to a high in the first quarter, presumably with the onset of winter. Similarly, the low for the year came in the third quarter with the onset of the summer. This seasonal effect is best seen in Figure 32 but can also be found in Figures 31 and 33.

Recharge Function

55. The NWBS is considered to be operating most efficiently when there is a reverse water-table gradient southeastward. Figure 34 shows that a condition near neutral (neither northwest or southeast) was maintained throughout FY89. Figure 35 compares water-table conditions across the barrier from a different perspective. The water table in the profile northwest of the barrier from a different perspective. The water table in the profile northwest of the barrier alignment tended to be higher than along the parallel profile situated southeast of the barrier alignment.

PART V: CONCLUSIONS

56. Based on the evaluation of the FY89 operations data for the Northwest Boundary System, the following conditions can be made:

a. Ground-water levels in the NWBS area were stable for FY89.

b. An increased flow of recharge water was directed by management decision to the northeast end of the system to raise the water table.

c. The desired neutral to southeastward gradient was maintained across the system throughout the year.

d. The water table showed a small decline at locations away from the influence of the system.

e. The treatment system in general effectively removed organic contaminants from the influent to the system. Chloroform was not as effectively removed by the treatment system as were the other organic contaminants monitored at the NWBS. Inorganic contaminants, such as chloride and fluoride, were not removed by the treatment system.

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APPENDIX A

FLOW DATA

D.P.A.

NORTHWEST BOUNDARY TREATMENT PLANT
FY 89 WEEKLY FLOWS FOR ADSORBERS

DATE	1 GAL(00)	1 GPM	2 GAL(00)	2 GPM	3 GAL(00)	3 GPM	TOTAL GAL(00)	TOTAL GPM
10/07/88	0	0.00	3,918	388.69	3,000	297.62	6,918	686.31
10/14/88	0	0.00	3,936	390.28	3,260	323.25	7,196	713.53
10/21/88	0	0.00	3,973	394.54	3,192	316.98	7,165	711.52
10/28/88	0	0.00	4,002	396.63	3,162	313.38	7,164	710.01
11/04/88	0	0.00	3,552	350.64	3,018	297.93	6,570	648.57
11/11/88	0	0.00	3,585	357.78	3,179	317.27	6,764	675.05
11/18/88	0	0.00	3,584	352.93	3,258	320.83	6,842	673.76
11/25/88	0	0.00	3,557	353.05	3,083	306.00	6,640	659.05
12/02/88	0	0.00	3,188	316.11	2,948	292.32	6,136	608.43
12/09/88	0	0.00	3,544	351.24	2,731	270.66	6,275	621.90
12/16/88	0	0.00	3,672	364.47	2,717	269.68	6,389	634.15
12/23/88	0	0.00	3,614	358.89	2,484	246.67	6,098	605.56
12/30/88	0	0.00	3,672	363.38	2,513	248.69	6,185	612.07
01/06/89	0	0.00	3,541	352.16	2,399	238.59	5,940	590.75
01/13/89	0	0.00	3,551	351.34	2,700	267.14	6,251	618.48
01/20/89	0	0.00	3,520	349.62	2,299	228.35	5,819	577.97
01/27/89	0	0.00	3,496	347.17	2,064	204.97	5,560	552.14
02/03/89	0	0.00	3,486	345.32	2,194	217.34	5,680	562.66
02/10/89	0	0.00	2,998	298.31	2,449	243.68	5,447	541.99
02/17/89	916	90.87	2,003	198.71	3,124	309.92	6,043	599.50
02/24/89	3,711	367.97	0	0.00	2,989	296.38	6,700	664.35
03/03/89	3,805	377.11	0	0.00	2,973	294.65	6,778	671.76
03/10/89	3,636	361.25	0	0.00	2,908	288.92	6,544	650.17
03/17/89	3,525	349.36	0	0.00	3,027	300.00	6,552	649.36
03/24/89	3,522	349.06	0	0.00	2,856	283.05	6,378	632.11
03/31/89	3,849	380.71	0	0.00	2,897	286.55	6,746	667.26
04/07/89	3,472	344.27	0	0.00	3,143	311.65	6,615	655.92
04/14/89	3,206	321.73	0	0.00	3,672	368.49	6,878	690.22
04/21/89	3,231	320.38	0	0.00	3,879	384.63	7,110	705.01
04/28/89	3,337	331.22	0	0.00	3,698	367.05	7,035	698.27
05/05/89	3,498	346.34	0	0.00	3,452	341.78	6,950	688.12
05/12/89	3,604	358.25	0	0.00	3,120	310.14	6,724	668.39
05/19/89	3,462	342.77	0	0.00	3,211	317.92	6,673	660.69
05/26/89	3,274	325.45	0	0.00	3,334	331.41	6,608	656.86
06/02/89	3,366	333.93	0	0.00	3,244	321.83	6,610	655.76
06/09/89	3,177	315.18	0	0.00	3,370	334.33	6,547	649.51
06/16/89	3,317	329.07	0	0.00	3,508	348.02	6,825	677.09
06/23/89	3,523	348.64	0	0.00	3,226	319.25	6,749	667.89
06/30/89	3,477	345.80	0	0.00	3,103	308.60	6,580	654.40
07/07/89	3,301	326.51	0	0.00	2,953	292.09	6,254	618.60
07/14/89	3,607	354.32	0	0.00	2,347	230.55	5,954	584.87
07/21/89	3,470	348.74	0	0.00	2,628	264.12	6,098	612.86
07/28/89	3,537	350.20	0	0.00	2,773	274.55	6,310	624.75

D.P.A.

NORTHWEST BOUNDARY TREATMENT PLANT
FY 89 WEEKLY FLOWS FOR ADSORBERS

	1		2		3		TOTAL	
DATE	GAL(00)	GPM	GAL(00)	GPM	GAL(00)	GPM	GAL(00)	GPM
08/04/89	3,646	362.25	0	0.00	2,946	292.70	6,592	654.95
08/11/89	3,542	351.39	0	0.00	2,364	234.52	5,906	585.91
08/18/89	3,486	346.00	0	0.00	2,310	229.28	5,796	575.28
08/25/89	3,137	310.59	634	62.77	1,696	167.92	5,467	541.28
09/01/89	3,783	375.86	324	32.19	1,760	174.86	5,867	582.91
09/08/89	3,582	355.53	2,591	257.17	0	0.00	6,173	612.70
09/15/89	3,118	309.33	2,490	247.02	0	0.00	5,608	556.35
09/22/89	3,473	344.37	2,953	292.81	0	0.00	6,426	637.18
09/30/89	4,090	355.19	3,343	290.32	0	0.00	7,433	645.51

D.P.A.

NORTHWEST BOUNDARY TREATMENT PLANT
FY 89 QUARTERLY FLOWS FOR ADSORBERS

	1		2		3		TOTAL	
DATE	GAL(00)	GPM	GAL(00)	GPM	GAL(00)	GPM	GAL(00)	GPM
1st QTR	0	0.00	47,797	364.51	38,545	293.94	86,342	658.45
2nd QTR	22,964	175.10	22,595	172.51	34,879	266.12	80,438	613.73
3rd QTR	43,944	335.62	0	0.00	43,960	335.78	87,904	671.39
4th QTR	45,772	345.41	12,335	90.94	21,777	166.20	79,884	602.55
ANNUAL	112,680	214.03	82,727	156.99	139,161	265.51	334,568	636.53

APPENDIX B

TREATMENT PLANT WATER QUALITY DATA STATISTICAL SUMMARY AND GC/MS ANALYSIS

NORTHWEST BOUNDARY TREATMENT PLANT - INFLUENT FOR FY 89

SAMPLE DATE	111TCE ug/l	112TCE ug/l	11DCE ug/l	11DCLE ug/l	12DCE ug/l	12DCLE ug/l	13DMB ug/l	ALDRN ug/l	AS ug/l
10/06/88	....	....	....	....	....	....	....	LT 0.050	....
10/13/88	....	....	....	....	....	....	....	LT 0.050	....
10/20/88	....	....	....	....	....	....	....	....	....
10/27/88	....	....	....	....	....	....	....	LT 0.050	....
11/03/88	....	....	....	....	....	....	....	LT 0.050	....
11/10/88	....	....	....	....	....	....	....	LT 0.050	....
11/17/88	....	....	....	....	....	....	....	LT 0.050	....
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	....	....	....	....	....	....	....	LT 0.050	....
12/08/88	....	....	....	....	....	....	....	LT 0.050	....
12/15/88	....	....	....	....	....	....	....	0.107	....
12/22/88	....	....	....	....	....	....	....	LT 0.050	....
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	....	....	....	....	....	....	....	LT 0.050	....
01/11/89	....	....	....	....	....	....	....	LT 0.050	....
01/18/89	LT 0.760	LT 0.780	LT 1.700	LT 0.730	LT 0.760	LT 1.100	LT 1.320	LT 0.050	LT 2.350
01/25/89	....	....	....	....	....	....	....	LT 0.050	....
02/01/89	....	....	....	....	....	....	....	LT 0.050	....
02/08/89	....	....	....	....	....	....	....	LT 0.050	....
02/15/89	....	....	....	....	....	....	....	LT 0.050	....
02/22/89	....	....	....	....	....	....	....	....	....
03/01/89	....	....	....	....	....	....	....	LT 0.050	....
03/08/89	....	....	....	....	....	....	....	LT 0.050	....
03/15/89	....	....	....	....	....	....	....	0.058	....
03/22/89	....	....	....	....	....	....	....	LT 0.050	....
03/29/89	....	....	....	....	....	....	....	LT 0.050	....
04/05/89	....	....	....	....	....	....	....	LT 0.050	....
04/12/89	....	....	....	....	....	....	....	LT 0.050	....
04/19/89	....	....	....	....	....	....	....	LT 0.050	....
04/26/89	....	....	....	....	....	....	....	LT 0.050	....
05/03/89	....	....	....	....	....	....	....	LT 0.050	....
05/10/89	....	....	....	....	....	....	....	LT 0.050	....
05/17/89	....	....	....	....	....	....	....	LT 0.050	....
05/24/89	....	....	....	....	....	....	....	LT 0.050	....
05/31/89	....	....	....	....	....	....	....	LT 0.050	....
06/07/89	....	....	....	....	....	....	....	LT 0.050	....
06/14/89	....	....	....	....	....	....	....	LT 0.050	....
06/21/89	LT 0.760	LT 0.780	LT 1.700	LT 0.730	LT 0.760	LT 1.100	LT 1.320	LT 0.050	LT 2.350
06/28/89	....	....	....	....	....	....	....	LT 0.050	....
07/05/89	....	....	....	....	....	....	....	LT 0.050	....
07/12/89	....	....	....	....	....	....	....	LT 0.050	....
07/19/89	....	....	....	....	....	....	....	LT 0.050	....
07/26/89	....	....	....	....	....	....	....	LT 0.050	....
08/02/89	....	....	....	....	....	....	....	LT 0.050	....
08/09/89	....	....	....	....	....	....	....	....	....
08/16/89	....	....	....	....	....	....	....	LT 0.050	....
08/23/89	....	....	....	....	....	....	....	LT 0.050	....
08/30/89	....	....	....	....	....	....	....	LT 0.050	....
09/06/89	....	....	....	....	....	....	....	LT 0.050	....
09/13/89	....	....	....	....	....	....	....	LT 0.050	....
09/20/89	....	....	....	....	....	....	....	LT 0.050	....
09/27/89	....	....	....	....	....	....	....	LT 0.050	....

LT = LESS THAN The Following Concentration

.... INDICATES THAT ANALYSIS WAS NOT PERFORMED

ug/l = MICROGRAM PER LITER

mg/l = MILLIGRAM PER LITER

NORTHWEST BOUNDARY TREATMENT PLANT - INFLUENT FOR FY 89

SAMPLE DATE	ATZ ug/l	BCHPD ug/l	BTZ ug/l	C6H6 ug/l	CCL4 ug/l	CH2CL2 ug/l	CHCL3 ug/l	CHLORIDE mg/l	CL6CP ug/l
10/06/88	....	....	....	....	....	....	....	330	....
10/13/88	....	....	....	....	....	....	....	....	....
10/20/88	....	....	....	....	....	....	....	310	....
10/27/88	....	....	....	....	....	....	....	330	....
11/03/88	....	....	....	....	....	....	....	290	....
11/10/88	....	....	....	....	....	....	....	330	....
11/17/88	....	....	....	....	....	....	....	320	....
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	....	....	....	....	....	....	....	310	....
12/08/88	....	....	....	....	....	....	....	310	....
12/15/88	....	....	....	....	....	....	....	260	....
12/22/88	....	....	....	....	....	....	....	270	....
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	....	....	....	....	....	....	....	270	....
01/11/89	....	....	....	....	....	....	....	250	....
01/18/89	LT 4.030	....	LT 5.000	LT 1.050	LT 0.990	LT 7.400	21.650	257	LT 0.048
01/25/89	....	....	....	....	....	....	....	290	....
02/01/89	....	....	....	....	....	....	....	260	....
02/08/89	....	....	....	....	....	....	....	240	....
02/15/89	....	....	....	....	....	....	....	240	....
02/22/89	....	....	....	....	....	....	....	240	....
03/01/89	....	....	....	....	....	....	....	240	....
03/08/89	....	....	....	....	....	....	....	250	....
03/15/89	....	....	....	....	....	....	....	240	....
03/22/89	....	....	....	....	....	....	....	240	....
03/29/89	....	....	....	....	....	....	....	240	....
04/05/89	....	....	....	....	....	....	....	240	....
04/12/89	....	....	....	....	....	....	....	230	....
04/19/89	....	....	....	....	....	....	....	240	....
04/26/89	....	....	....	....	....	....	....	240	....
05/03/89	....	....	....	....	....	....	....	230	....
05/10/89	....	....	....	....	....	....	....	280	....
05/17/89	....	....	....	....	....	....	....	240	....
05/24/89	....	....	....	....	....	....	....	260	....
05/31/89	....	....	....	....	....	....	....	230	....
06/07/89	....	....	....	....	....	....	....	210	....
06/14/89	....	....	....	....	....	....	....	230	....
06/21/89	....	LT 5.900	LT 5.000	LT 1.050	LT 0.990	LT 7.400	47.800	267	LT 0.048
06/28/89	....	....	....	....	....	....	....	300	....
07/05/89	....	....	....	....	....	....	....	360	....
07/12/89	....	....	....	....	....	....	....	290	....
07/19/89	....	....	....	....	....	....	....	240	....
07/26/89	....	....	....	....	....	....	....	270	....
08/02/89	....	....	....	....	....	....	....	230	....
08/09/89	....	....	....	....	....	....	....	260	....
08/16/89	....	....	....	....	....	....	....	220	....
08/23/89	....	....	....	....	....	....	....	190	....
08/30/89	....	....	....	....	....	....	....	290	....
09/06/89	....	....	....	....	....	....	....	270	....
09/13/89	....	....	....	....	....	....	....	260	....
09/20/89	....	....	....	....	....	....	....	280	....
09/27/89	....	....	....	....	....	....	....	310	....

LT = LESS THAN The Following Concentration .... INDICATES THAT ANALYSIS WAS NOT PERFORMED
ug/l = MICROGRAM PER LITER mg/l = MILLIGRAM PER LITER

NORTHWEST BOUNDARY TREATMENT PLANT - INFLUENT FOR FY 89

SAMPLE DATE	CLC6H5 ug/l	CLDAN ug/l	CPMS ug/l	CPMSO ug/l	CPMSO2 ug/l	DBCP ug/l	DCPD ug/l	DDVP ug/l	DIMP ug/l
10/06/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	....	....	3.550
10/13/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	....	....	3.430
10/20/88	....	....	LT 5.690	LT 11.500	LT 7.460	....	LT 5.000	....	....
10/27/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.660
11/03/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.660
11/10/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.570
11/17/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.610
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.620
12/08/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.140
12/15/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.350
12/22/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.260
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.360
01/11/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.040
01/18/89	LT 0.820	LT 0.095	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	LT 0.384	3.160
01/25/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.950
02/01/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.280
02/08/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.010
02/15/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.470
02/22/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.620
03/01/89	....	....	....	....	....	....	LT 5.000	....	2.840
03/08/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.680
03/15/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.460
03/22/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	....	....	2.730
03/29/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.780
04/05/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.570
04/12/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.740
04/19/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.960
04/26/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.190
05/03/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.540
05/10/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.525
05/17/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.230
05/24/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.640
05/31/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.280
06/07/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.140
06/14/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.340
06/21/89	LT 0.820	LT 0.095	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.573
06/28/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	5.590
07/05/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	5.010
07/12/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.930
07/19/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	860
07/26/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.220
08/02/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.990
08/09/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.220
08/16/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.800
08/23/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.010
08/30/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.040
09/06/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.410
09/13/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.000
09/20/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	....	....	1.970
09/27/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	....

LT = LESS THAN The Following Concentration .... INDICATES THAT ANALYSIS WAS NOT PERFORMED

ug/l = MICROGRAM PER LITER mg/l = MILLIGRAM PER LITER

NORTHWEST BOUNDARY TREATMENT PLANT - INFLUENT FOR FY 89

SAMPLE DATE	DITH ug/l	DLDRN ug/l	DMDS ug/l	ENDRN ug/l	ETC6H5 ug/l	FLUORIDE mg/l	ISODR ug/l	MEC6H5 ug/l	MLTHN ug/l
10/06/88	LT 1.340	0.324	....	LT 0.050	....	2.510	LT 0.051	....	....
10/13/88	LT 1.340	0.318	....	LT 0.050	....	....	LT 0.051	....	....
10/20/88	LT 1.340	....	....	....	....	2.310	....	....	....
10/27/88	LT 1.340	0.282	....	LT 0.050	....	2.550	LT 0.051	....	....
11/03/88	LT 1.340	0.278	....	LT 0.050	....	2.470	LT 0.051	....	....
11/10/88	LT 1.340	0.288	....	LT 0.050	....	2.510	LT 0.051	....	....
11/17/88	LT 1.340	0.346	....	LT 0.050	....	2.720	LT 0.051	....	....
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	LT 1.340	0.086	....	0.046	....	2.670	0.085	....	....
12/08/88	LT 1.340	0.417	....	LT 0.050	....	2.830	0.086	....	....
12/15/88	LT 1.340	0.654	....	LT 0.050	....	2.440	0.077	....	....
12/22/88	LT 1.340	0.377	....	LT 0.050	....	2.270	LT 0.051	....	....
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	LT 1.340	0.371	....	LT 0.050	....	2.300	LT 0.051	....	....
01/11/89	LT 1.340	0.435	....	LT 0.050	....	2.200	LT 0.051	....	....
01/18/89	LT 1.340	0.405	LT 0.550	LT 0.050	LT 1.370	2.163	LT 0.051	LT 1.470	87,500
01/25/89	LT 1.340	0.487	....	LT 0.050	....	2.270	0.063	....	....
02/01/89	LT 1.340	0.496	....	LT 0.050	....	2.240	LT 0.051	....	....
02/08/89	LT 1.340	0.495	....	LT 0.050	....	1.980	LT 0.051	....	....
02/15/89	LT 1.340	0.516	....	LT 0.050	....	2.240	LT 0.051	....	....
02/22/89	LT 1.340	....	....	....	....	2.070	....	....	....
03/01/89	....	0.388	....	LT 0.050	....	2.050	LT 0.051	....	....
03/08/89	LT 1.340	0.367	....	LT 0.050	....	2.220	LT 0.051	....	....
03/15/89	LT 1.340	0.412	....	LT 0.050	....	2.070	LT 0.051	....	....
03/22/89	LT 1.340	0.417	....	LT 0.050	....	1.910	LT 0.051	....	....
03/29/89	LT 1.340	0.364	....	LT 0.050	....	1.920	LT 0.051	....	....
04/05/89	LT 1.340	0.375	....	LT 0.050	....	1.920	0.072	....	....
04/12/89	LT 1.340	0.469	....	LT 0.050	....	1.800	LT 0.051	....	....
04/19/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.830	LT 0.051	....	....
04/26/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.860	LT 0.051	....	....
05/03/89	LT 1.340	0.431	....	LT 0.050	....	1.710	LT 0.051	....	....
05/10/89	LT 1.340	0.431	....	LT 0.050	....	1.975	LT 0.051	....	....
05/17/89	LT 1.340	0.418	....	LT 0.050	....	1.750	LT 0.051	....	....
05/24/89	LT 1.340	0.390	....	LT 0.050	....	1.760	LT 0.051	....	....
05/31/89	LT 1.340	0.419	....	LT 0.050	....	1.550	LT 0.051	....	....
06/07/89	LT 1.340	0.370	....	LT 0.050	....	1.360	LT 0.051	....	....
06/14/89	LT 1.340	0.403	....	LT 0.050	....	1.410	LT 0.051	....	....
06/21/89	LT 1.340	0.451	LT 0.405	LT 0.050	LT 1.370	2.017	LT 0.051	LT 1.470	....
06/28/89	LT 1.340	0.372	....	LT 0.050	....	2.250	LT 0.051	....	....
07/05/89	LT 1.340	0.439	....	LT 0.050	....	2.700	LT 0.051	....	....
07/12/89	LT 1.340	0.514	....	LT 0.050	....	2.480	LT 0.051	....	....
07/19/89	LT 1.340	0.537	....	LT 0.050	....	2.220	LT 0.051	....	....
07/26/89	LT 1.340	0.467	....	LT 0.050	....	2.080	LT 0.051	....	....
08/02/89	LT 1.340	0.422	....	LT 0.050	....	2.110	LT 0.051	....	....
08/09/89	LT 1.340	0.424	....	LT 0.050	....	2.140	LT 0.051	....	....
08/16/89	LT 1.340	0.505	....	LT 0.050	....	2.110	LT 0.051	....	....
08/23/89	LT 1.340	0.466	....	LT 0.050	....	2.060	LT 0.051	....	....
08/30/89	LT 1.340	0.458	....	LT 0.050	....	2.070	LT 0.051	....	....
09/06/89	LT 1.340	0.444	....	LT 0.050	....	2.000	LT 0.051	....	....
09/13/89	LT 1.340	0.238	....	LT 0.050	....	1.980	LT 0.051	....	....
09/20/89	LT 1.340	0.422	....	LT 0.050	....	2.050	LT 0.051	....	....
09/27/89	LT 1.340	0.469	....	LT 0.050	....	2.300	LT 0.051	....	....

LT = LESS THAN The Following Concentration .... INDICATES THAT ANALYSIS WAS NOT PERFORMED

ug/l = MICROGRAM PER LITER mg/l = MILLIGRAM PER LITER

NORTHWEST BOUNDARY TREATMENT PLANT - INFLUENT FOR FY 89

SAMPLE DATE	OXAT ug/l	PPDDE ug/l	PPDDE ug/l	PRTHN ug/l	SO4 mg/l	SUPONA ug/l	TCLEE ug/l	TRCLE ug/l	XYLEN ug/l
10/06/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
10/13/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
10/20/88	LT 2.380	....	....	....	....	....	....	....	....
10/27/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
11/03/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
11/10/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
11/17/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
12/08/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
12/15/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
12/22/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
01/11/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
01/18/89	LT 2.380	LT 0.054	LT 0.049	LT 0.647	130	LT 0.769	....	LT 0.560	LT 1.360
01/25/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
02/01/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
02/08/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
02/15/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
02/22/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
03/01/89	....	....	....	....	....	....	....	LT 0.560	....
03/08/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
03/15/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
03/22/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
03/29/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
04/05/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
04/12/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
04/19/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
04/26/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
05/03/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
05/10/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
05/17/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
05/24/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
05/31/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
06/07/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
06/14/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
06/21/89	LT 2.380	LT 0.054	LT 0.049	1.765	140	....	LT 0.750	0.668	LT 1.360
06/28/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
07/05/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
07/12/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
07/19/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
07/26/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/02/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/09/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/16/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/23/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/30/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
09/06/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
09/13/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
09/20/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
09/27/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....

LT = LESS THAN The Following Concentration

.... INDICATES THAT ANALYSIS WAS NOT PERFORMED

ug/l = MICROGRAM PER LITER

mg/l = MILLIGRAM PER LITER

NORTHWEST BOUNDARY TREATMENT PLANT - EFFLUENT FOR FY 89

SAMPLE DATE	111TCE ug/l	112TCE ug/l	11DCE ug/l	11DCLE ug/l	12DCE ug/l	12DCLE ug/l	13DMB ug/l	ALDRN ug/l	AS ug/l
10/06/88	....	....	....	....	....	....	....	LT 0.050	....
10/13/88	....	....	....	....	....	....	....	LT 0.050	....
10/20/88	....	....	....	....	....	....	....	....	....
10/27/88	....	....	....	....	....	....	....	LT 0.050	....
11/03/88	....	....	....	....	....	....	....	LT 0.050	....
11/10/88	....	....	....	....	....	....	....	LT 0.050	....
11/17/88	....	....	....	....	....	....	....	LT 0.050	....
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	....	....	....	....	....	....	....	LT 0.050	....
12/08/88	....	....	....	....	....	....	....	LT 0.050	....
12/15/88	....	....	....	....	....	....	....	0.116	....
12/22/88	....	....	....	....	....	....	....	LT 0.050	....
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	....	....	....	....	....	....	....	LT 0.050	....
01/11/89	....	....	....	....	....	....	....	LT 0.050	....
01/18/89	LT 0.760	LT 0.780	LT 1.700	LT 0.730	LT 0.760	LT 1.100	LT 1.320	LT 0.050	LT 2.350
01/25/89	....	....	....	....	....	....	....	LT 0.050	....
02/01/89	....	....	....	....	....	....	....	LT 0.050	....
02/08/89	....	....	....	....	....	....	....	0.073	....
02/15/89	....	....	....	....	....	....	....	LT 0.050	....
02/22/89	....	....	....	....	....	....	....	....	....
03/01/89	....	....	....	....	....	....	....	LT 0.050	....
03/08/89	....	....	....	....	....	....	....	LT 0.050	....
03/15/89	....	....	....	....	....	....	....	LT 0.050	....
03/22/89	....	....	....	....	....	....	....	LT 0.050	....
03/29/89	....	....	....	....	....	....	....	LT 0.050	....
04/05/89	....	....	....	....	....	....	....	LT 0.050	....
04/12/89	....	....	....	....	....	....	....	LT 0.050	....
04/19/89	....	....	....	....	....	....	....	0.081	....
04/26/89	....	....	....	....	....	....	....	LT 0.050	....
05/03/89	....	....	....	....	....	....	....	LT 0.050	....
05/10/89	....	....	....	....	....	....	....	LT 0.050	....
05/17/89	....	....	....	....	....	....	....	LT 0.050	....
05/24/89	....	....	....	....	....	....	....	LT 0.050	....
05/31/89	....	....	....	....	....	....	....	LT 0.050	....
06/07/89	....	....	....	....	....	....	....	LT 0.050	....
06/14/89	....	....	....	....	....	....	....	LT 0.050	....
06/21/89	LT 0.760	LT 0.780	LT 1.700	LT 0.730	LT 0.760	LT 1.100	LT 1.320	LT 0.050	LT 2.350
06/28/89	....	....	....	....	....	....	....	LT 0.050	....
07/05/89	....	....	....	....	....	....	....	LT 0.050	....
07/12/89	....	....	....	....	....	....	....	LT 0.050	....
07/19/89	....	....	....	....	....	....	....	LT 0.050	....
07/26/89	....	....	....	....	....	....	....	LT 0.050	....
08/02/89	....	....	....	....	....	....	....	LT 0.050	....
08/09/89	....	....	....	....	....	....	....	....	....
08/16/89	....	....	....	....	....	....	....	LT 0.050	....
08/23/89	....	....	....	....	....	....	....	LT 0.050	....
08/30/89	....	....	....	....	....	....	....	LT 0.050	....
09/06/89	....	....	....	....	....	....	....	LT 0.050	....
09/13/89	....	....	....	....	....	....	....	LT 0.050	....
09/20/89	....	....	....	....	....	....	....	LT 0.050	....
09/27/89	....	....	....	....	....	....	....	LT 0.050	....

LT = LESS THAN The Following Concentration .... INDICATES THAT ANALYSIS WAS NOT PERFORMED

ug/l = MICROGRAM PER LITER mg/l = MILLIGRAM PER LITER

NORTHWEST BOUNDARY TREATMENT PLANT - EFFLUENT FOR FY 89

SAMPLE DATE	ATZ ug/l	BCHPD ug/l	BTZ ug/l	C6H6 ug/l	CCL4 ug/l	CH2CL2 ug/l	CHCL3 ug/l	CHLORIDE mg/l	CL6CP ug/l
10/06/88	....	....	....	....	....	....	....	330	....
10/13/88	....	....	....	....	....	....	....	....	....
10/20/88	....	....	....	....	....	....	....	300	....
10/27/88	....	....	....	....	....	....	....	330	....
11/03/88	....	....	....	....	....	....	....	290	....
11/10/88	....	....	....	....	....	....	....	300	....
11/17/88	....	....	....	....	....	....	....	320	....
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	....	....	....	....	....	....	....	300	....
12/08/88	....	....	....	....	....	....	....	310	....
12/15/88	....	....	....	....	....	....	....	270	....
12/22/88	....	....	....	....	....	....	....	270	....
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	....	....	....	....	....	....	....	270	....
01/11/89	....	....	....	....	....	....	....	250	....
01/18/89	LT 4.030	....	LT 5.000	LT 1.050	LT 0.990	LT 7.400	23.500	250	LT 0.048
01/25/89	....	....	....	....	....	....	....	270	....
02/01/89	....	....	....	....	....	....	....	260	....
02/08/89	....	....	....	....	....	....	....	230	....
02/15/89	....	....	....	....	....	....	....	250	....
02/22/89	....	....	....	....	....	....	....	240	....
03/01/89	....	....	....	....	....	....	....	240	....
03/08/89	....	....	....	....	....	....	....	250	....
03/15/89	....	....	....	....	....	....	....	230	....
03/22/89	....	....	....	....	....	....	....	240	....
03/29/89	....	....	....	....	....	....	....	240	....
04/05/89	....	....	....	....	....	....	....	240	....
04/12/89	....	....	....	....	....	....	....	230	....
04/19/89	....	....	....	....	....	....	....	240	....
04/26/89	....	....	....	....	....	....	....	230	....
05/03/89	....	....	....	....	....	....	....	230	....
05/10/89	....	....	....	....	....	....	....	270	....
05/17/89	....	....	....	....	....	....	....	240	....
05/24/89	....	....	....	....	....	....	....	250	....
05/31/89	....	....	....	....	....	....	....	230	....
06/07/89	....	....	....	....	....	....	....	200	....
06/14/89	....	....	....	....	....	....	....	210	....
06/21/89	....	LT 5.900	LT 5.000	LT 1.050	LT 0.990	LT 7.400	19.700	265	LT 0.048
06/28/89	....	....	....	....	....	....	....	300	....
07/05/89	....	....	....	....	....	....	....	350	....
07/12/89	....	....	....	....	....	....	....	280	....
07/19/89	....	....	....	....	....	....	....	240	....
07/26/89	....	....	....	....	....	....	....	250	....
08/02/89	....	....	....	....	....	....	....	240	....
08/09/89	....	....	....	....	....	....	....	230	....
08/16/89	....	....	....	....	....	....	....	220	....
08/23/89	....	....	....	....	....	....	....	230	....
08/30/89	....	....	....	....	....	....	....	270	....
09/06/89	....	....	....	....	....	....	....	260	....
09/13/89	....	....	....	....	....	....	....	260	....
09/20/89	....	....	....	....	....	....	....	280	....
09/27/89	....	....	....	....	....	....	....	330	....

LT = LESS THAN The Following Concentration

.... INDICATES THAT ANALYSIS WAS NOT PERFORMED

ug/l = MICROGRAM PER LITER

mg/l = MILLIGRAM PER LITER

NORTHWEST BOUNDARY TREATMENT PLANT - EFFLUENT FOR FY 89

SAMPLE DATE	CLC6H5 ug/l	CLDAN ug/l	CPMS ug/l	CPMSO ug/l	CPMSO2 ug/l	DBCP ug/l	DCPD ug/l	DDVP ug/l	DIMP ug/l
10/06/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	....	....	4.310
10/13/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	....	....	5.080
10/20/88	....	....	LT 5.690	LT 11.500	LT 7.460	....	LT 5.000	....	....
10/27/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.410
11/03/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.990
11/10/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	5.180
11/17/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	5.590
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.490
12/08/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.390
12/15/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.610
12/22/88	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.490
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	5.240
01/11/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.590
01/18/89	LT 0.820	LT 0.095	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	LT 0.384	3.770
01/25/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.510
02/01/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.820
02/08/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.470
02/15/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.740
02/22/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.760
03/01/89	....	....	....	....	....	....	LT 5.000	....	3.350
03/08/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.650
03/15/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.360
03/22/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	....	....	3.850
03/29/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.660
04/05/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.190
04/12/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	5.900
04/19/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.770
04/26/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.470
05/03/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.240
05/10/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.970
05/17/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.360
05/24/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.450
05/31/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.650
06/07/89	....	....	....	....	....	LT 0.195	LT 5.000	....	4.460
06/14/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.200
06/21/89	LT 0.820	LT 0.095	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.710
06/28/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	5.740
07/05/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	5.090
07/12/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	5.390
07/19/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	830
07/26/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.310
08/02/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	2.550
08/09/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.950
08/16/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.840
08/23/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.890
08/30/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.360
09/06/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	4.150
09/13/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	3.910
09/20/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	....	....	3.160
09/27/89	....	....	LT 5.690	LT 11.500	LT 7.460	LT 0.195	LT 5.000	....	....

LT = LESS THAN The Following Concentration .... INDICATES THAT ANALYSIS WAS NOT PERFORMED

ug/l = MICROGRAM PER LITER mg/l = MILLIGRAM PER LITER

NORTHWEST BOUNDARY TREATMENT PLANT - EFFLUENT FOR FY 89

SAMPLE DATE	DITH ug/l	DLDRN ug/l	DMDS ug/l	ENDRN ug/l	ETC6H5 ug/l	FLUORIDE mg/l	ISODR ug/l	MEC6H5 ug/l	MLTHN ug/l
10/06/88	LT 1.340	LT 0.050	....	LT 0.050	....	2.550	LT 0.051	....	....
10/13/88	LT 1.340	LT 0.050	....	LT 0.050	....	....	LT 0.051	....	....
10/20/88	LT 1.340	....	....	....	....	2.300	....	....	....
10/27/88	LT 1.340	LT 0.050	....	LT 0.050	....	2.600	LT 0.051	....	....
11/03/88	LT 1.340	LT 0.050	....	LT 0.050	....	2.480	LT 0.051	....	....
11/10/88	LT 1.340	LT 0.050	....	LT 0.050	....	2.530	LT 0.051	....	....
11/17/88	LT 1.340	LT 0.050	....	LT 0.050	....	2.650	LT 0.051	....	....
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	LT 1.340	LT 0.050	....	LT 0.050	....	2.680	LT 0.051	....	....
12/08/88	LT 1.340	LT 0.050	....	LT 0.050	....	2.720	LT 0.051	....	....
12/15/88	LT 1.340	LT 0.050	....	LT 0.050	....	2.480	LT 0.051	....	....
12/22/88	LT 1.340	LT 0.050	....	LT 0.050	....	2.310	LT 0.051	....	....
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.320	LT 0.051	....	....
01/11/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.380	LT 0.051	....	....
01/18/89	LT 1.340	LT 0.050	LT 0.550	LT 0.050	LT 1.370	2.185	LT 0.051	LT 1.470	90,000
01/25/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.210	LT 0.051	....	....
02/01/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.260	LT 0.051	....	....
02/08/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.050	LT 0.051	....	....
02/15/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.200	LT 0.051	....	....
02/22/89	LT 1.340	....	....	....	....	2.090	....	....	....
03/01/89	....	LT 0.050	....	LT 0.050	....	2.090	LT 0.051	....	....
03/08/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.190	LT 0.051	....	....
03/15/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.970	LT 0.051	....	....
03/22/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.930	LT 0.051	....	....
03/29/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.910	LT 0.051	....	....
04/05/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.910	LT 0.051	....	....
04/12/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.840	LT 0.051	....	....
04/19/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.790	LT 0.051	....	....
04/26/89	LT 1.340	0.192	....	LT 0.050	....	1.910	LT 0.051	....	....
05/03/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.700	LT 0.051	....	....
05/10/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.030	LT 0.051	....	....
05/17/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.730	LT 0.051	....	....
05/24/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.680	LT 0.051	....	....
05/31/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.570	LT 0.051	....	....
06/07/89	....	LT 0.050	....	LT 0.050	....	1.390	LT 0.051	....	....
06/14/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.430	LT 0.051	....	....
06/21/89	LT 1.340	LT 0.050	LT 0.429	LT 0.050	LT 1.370	2.055	LT 0.051	LT 1.470	....
06/28/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.250	LT 0.051	....	....
07/05/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.630	LT 0.051	....	....
07/12/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.420	LT 0.051	....	....
07/19/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.140	LT 0.051	....	....
07/26/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.100	LT 0.051	....	....
08/02/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.190	LT 0.051	....	....
08/09/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.110	LT 0.051	....	....
08/16/89	LT 1.340	0.096	....	LT 0.050	....	2.140	LT 0.051	....	....
08/23/89	LT 1.340	0.055	....	LT 0.050	....	2.040	LT 0.051	....	....
08/30/89	LT 1.340	0.062	....	LT 0.050	....	2.030	LT 0.051	....	....
09/06/89	LT 1.340	LT 0.050	....	LT 0.050	....	1.700	LT 0.051	....	....
09/13/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.150	LT 0.051	....	....
09/20/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.030	LT 0.051	....	....
09/27/89	LT 1.340	LT 0.050	....	LT 0.050	....	2.370	LT 0.051	....	....

LT = LESS THAN The Following Concentration .... INDICATES THAT ANALYSIS WAS NOT PERFORMED

ug/l = MICROGRAM PER LITER mg/l = MILLIGRAM PER LITER

NORTHWEST BOUNDARY TREATMENT PLANT - EFFLUENT FOR FY 89

SAMPLE DATE	OXAT ug/l	PPDDE ug/l	PPDDE ug/l	PRTHN ug/l	SO4 mg/l	SUPONA ug/l	TCLEE ug/l	TRCLE ug/l	XYLEN ug/l
10/06/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
10/13/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
10/20/88	LT 2.380	....	....	....	....	....	....	....	....
10/27/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
11/03/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
11/10/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
11/17/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
11/24/88	....	....	....	....	....	....	....	....	....
12/01/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
12/08/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
12/15/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
12/22/88	LT 2.380	....	....	....	....	....	....	LT 0.560	....
12/29/88	....	....	....	....	....	....	....	....	....
01/04/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
01/11/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
01/18/89	LT 2.380	LT 0.054	LT 0.049	LT 0.647	130	LT 0.769	....	LT 0.560	LT 1.360
01/25/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
02/01/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
02/08/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
02/15/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
02/22/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
03/01/89	....	....	....	....	....	....	....	LT 0.560	....
03/08/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
03/15/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
03/22/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
03/29/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
04/05/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
04/12/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
04/19/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
04/26/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
05/03/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
05/10/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
05/17/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
05/24/89	LT 2.380	....	....	....	....	....	....	....	....
05/31/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
06/07/89	....	....	....	....	....	....	....	....	....
06/14/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
06/21/89	LT 2.380	LT 0.054	LT 0.049	1.660	140	....	1.970	LT 0.560	LT 1.360
06/28/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
07/05/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
07/12/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
07/19/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
07/26/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/02/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/09/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/16/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/23/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
08/30/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
09/06/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
09/13/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
09/20/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....
09/27/89	LT 2.380	....	....	....	....	....	....	LT 0.560	....

LT = LESS THAN The Following Concentration .... INDICATES THAT ANALYSIS WAS NOT PERFORMED
ug/l = MICROGRAM PER LITER mg/l = MILLIGRAM PER LITER

D.P.A.

09/18/90

DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY SYSTEM

SITE: PWININ

ANALYTE	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	CERTIFIED REPORT LIMIT (LT)	UOM	MEAN	LOW VALUE	HIGH VALUE
111TCE	2	0	0%	N8	0.76	UGL	LT CRL	LT CRL	LT CRL
112TCE	2	0	0%	N8	0.78	UGL	LT CRL	LT CRL	LT CRL
11DCE	2	0	0%	N8	1.70	UGL	LT CRL	LT CRL	LT CRL
11DCLE	2	0	0%	N8	0.73	UGL	LT CRL	LT CRL	LT CRL
12DCE	2	0	0%	N8	0.76	UGL	LT CRL	LT CRL	LT CRL
12DCLE	2	0	0%	N8	1.10	UGL	LT CRL	LT CRL	LT CRL
13DMB	2	0	0%	AV8	1.32	UGL	LT CRL	LT CRL	LT CRL
ALDRN	47	2	4%	KK8	0.05	UGL	LT CRL	LT CRL	0.11
AS	2	0	0%	AX8	2.35	UGL	LT CRL	LT CRL	LT CRL
ATZ	1	0	0%	UH11	4.03	UGL	LT CRL	LT CRL	LT CRL
BCHPD	1	0	0%	P8	5.90	UGL	LT CRL	LT CRL	LT CRL
BTZ	2	0	0%	AAA8	5.00	UGL	LT CRL	LT CRL	LT CRL
C6H6	2	0	0%	AV8	1.05	UGL	LT CRL	LT CRL	LT CRL
CCL4	2	0	0%	N8	0.99	UGL	LT CRL	LT CRL	LT CRL
CH2CL2	2	0	0%	N8	7.40	UGL	LT CRL	LT CRL	LT CRL
CHCL3	2	2	100%	N8		UGL	34.73	21.65	47.80
CL	49	49	100%	HH8A, TT09		MGL	264.97	190.00	360.00
CL6CP	2	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
CLC6H5	2	0	0%	N8	0.82	UGL	LT CRL	LT CRL	LT CRL
CLDAN	2	0	0%	KK8	0.10	UGL	LT CRL	LT CRL	LT CRL
CPMS	49	0	0%	AAA8	5.69	UGL	LT CRL	LT CRL	LT CRL
CPMSO	49	0	0%	AAA8	11.5	UGL	LT CRL	LT CRL	LT CRL
CPMSO2	49	0	0%	AAA8	7.46	UGL	LT CRL	LT CRL	LT CRL
DBCP	48	0	0%	AY8	0.20	UGL	LT CRL	LT CRL	LT CRL
DCPD	46	0	0%	P8	5.00	UGL	LT CRL	LT CRL	LT CRL
DDVP	1	0	0%	UH11	0.38	UGL	LT CRL	LT CRL	LT CRL
DIMP	47	47	100%	AW8A, AT8		UGL	3.32	1.97	5.59
DITH	49	0	0%	AAA8	1.34	UGL	LT CRL	LT CRL	LT CRL
DLDRN	48	46	96%	KK8	0.05	UGL	0.39	LT CRL	0.65
DMDS	2	0	0%	AAA8	0.55	UGL	LT CRL	LT CRL	LT CRL
DMMP	1	0	0%	AT8	0.19	UGL	LT CRL	LT CRL	LT CRL
ENDRN	48	1	2%	KK8	0.05	UGL	LT CRL	LT CRL	0.05
ETC6H5	2	0	0%	AV8	1.37	UGL	LT CRL	LT CRL	LT CRL
F	49	49	100%	HH8A, TT09		MGL	2.13	1.36	2.83
ISODR	48	5	10%	KK8	0.05	UGL	LT CRL	LT CRL	0.09
MEC6H5	2	0	0%	AV8	1.47	UGL	LT CRL	LT CRL	LT CRL
MIBK	1	0	0%	P8	4.90	UGL	LT CRL	LT CRL	LT CRL
MLTHN	1	0	0%	UH11	0.37	UGL	LT CRL	LT CRL	LT CRL
OXAT	49	0	0%	AAA8	2.38	UGL	LT CRL	LT CRL	LT CRL
PPDDE	2	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
PPDDT	2	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
PRTHN	2	1	50%	UH11	0.65	UGL	LT CRL	LT CRL	1.76
SO4	2	2	100%	HH8A		MGL	135.00	130.00	140.00
SUPONA	1	0	0%	UH11	0.79	UGL	LT CRL	LT CRL	LT CRL
TCLEE	2	0	0%	N8	0.75	UGL	LT CRL	LT CRL	LT CRL
TRCLE	49	1	2%	N8	0.56	UGL	LT CRL	LT CRL	0.67
XYLEN	2	0	0%	AV8	1.36	UGL	LT CRL	LT CRL	LT CRL
ZN	2	1	50%	GG8, SS12	18.0	UGL	LT CRL	LT CRL	22.95

D.P.A.

09/18/90

DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY SYSTEM

SITE: PWEFEF

ANALYTE	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	CERTIFIED REPORT LIMIT (LT)	UOM	MEAN	LOW VALUE	HIGH VALUE
111TCE	2	0	0%	N8	0.76	UGL	LT CRL	LT CRL	LT CRL
112TCE	2	0	0%	N8	0.78	UGL	LT CRL	LT CRL	LT CRL
11DCE	2	0	0%	N8	1.70	UGL	LT CRL	LT CRL	LT CRL
11DCLE	2	0	0%	N8	0.73	UGL	LT CRL	LT CRL	LT CRL
12DCE	2	0	0%	N8	0.76	UGL	LT CRL	LT CRL	LT CRL
12DCLE	2	0	0%	N8	1.10	UGL	LT CRL	LT CRL	LT CRL
13DMB	2	0	0%	AV8	1.32	UGL	LT CRL	LT CRL	LT CRL
ALDRN	47	3	6%	KK8	0.05	UGL	LT CRL	LT CRL	0.1
AS	2	0	0%	AX8	2.35	UGL	LT CRL	LT CRL	LT CRL
ATZ	1	0	0%	UH11	4.03	UGL	LT CRL	LT CRL	LT CRL
BCHPD	1	0	0%	P8	5.90	UGL	LT CRL	LT CRL	LT CRL
BTZ	2	0	0%	AAA8	5.00	UGL	LT CRL	LT CRL	LT CRL
C6H6	2	0	0%	AV8	1.05	UGL	LT CRL	LT CRL	LT CRL
CCL4	2	0	0%	N8	0.99	UGL	LT CRL	LT CRL	LT CRL
CH2CL2	2	0	0%	N8	7.40	UGL	LT CRL	LT CRL	LT CRL
CHCL3	2	2	100%	N8		UGL	21.60	19.70	23.50
CL	49	49	100%	HH8A, TT09		MGL	261.53	200.00	350.00
CL6CP	2	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
CLC6H5	2	0	0%	N8	0.82	UGL	LT CRL	LT CRL	LT CRL
CLDAN	2	0	0%	KK8	0.10	UGL	LT CRL	LT CRL	LT CRL
CPMS	48	0	0%	AAA8	5.69	UGL	LT CRL	LT CRL	LT CRL
CPMSO	48	0	0%	AAA8	11.5	UGL	LT CRL	LT CRL	LT CRL
CPMSO2	48	0	0%	AAA8	7.46	UGL	LT CRL	LT CRL	LT CRL
DBCP	48	0	0%	AY8	0.20	UGL	LT CRL	LT CRL	LT CRL
DCPD	46	0	0%	P8	5.00	UGL	LT CRL	LT CRL	LT CRL
DDVP	1	0	0%	UH11	0.38	UGL	LT CRL	LT CRL	LT CRL
DIMP	47	47	100%	AW8A, AT8		UGL	4.17	2.19	5.90
DITH	48	0	0%	AAA8	1.34	UGL	LT CRL	LT CRL	LT CRL
DLDRN	48	4	8%	KK8	0.05	UGL	LT CRL	LT CRL	0.1
DMDS	2	0	0%	AAA8	0.55	UGL	LT CRL	LT CRL	LT CRL
DMMP	1	0	0%	AT8	0.19	UGL	LT CRL	LT CRL	LT CRL
ENDRN	48	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
ETC6H5	2	0	0%	AV8	1.37	UGL	LT CRL	LT CRL	LT CRL
F	49	49	100%	HH8A, TT09		MGL	2.13	1.39	2.72
ISODR	48	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
MEC6H5	2	0	0%	AV8	1.47	UGL	LT CRL	LT CRL	LT CRL
MIBK	1	0	0%	P8	4.90	UGL	LT CRL	LT CRL	LT CRL
MLTHN	1	0	0%	UH11	0.37	UGL	LT CRL	LT CRL	LT CRL
OXAT	48	0	0%	AAA8	2.38	UGL	LT CRL	LT CRL	LT CRL
PPDDE	2	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
PPDDT	2	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
PRTHN	2	1	50%	UH11	0.65	UGL	LT CRL	LT CRL	1.66
SO4	2	2	100%	HH8A		MGL	135.00	130.00	140.0
SUPONA	1	0	0%	UH11	0.79	UGL	LT CRL	LT CRL	LT CRL
TCLEE	2	1	50%	N8	0.75	UGL	LT CRL	LT CRL	1.97
TRCLE	47	0	0%	N8	0.56	UGL	LT CRL	LT CRL	LT CRL
XYLEN	2	0	0%	AV8	1.36	UGL	LT CRL	LT CRL	LT CRL
ZN	2	0	0%	GG8, SS12	22.0, 18.0	UGL	LT CRL	LT CRL	LT CRL

D.P.A.

03/09/90

DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY SYSTEM

SITE: PWININ

ANALYTE	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	CERTIFIED REPORT LIMIT (LT)	UOM	MEAN	LOW VALUE	HIGH VALUE
MLTHN	2	0	0%	UH11	0.37	UGL	LT CRL	LT CRL	LT CRL
NA	4	4	100%	GG8, SS12		UGL	182,500.00	999.00	190,000
NIT	2	2	100%	LL8		UGL	6,650.00	999.00	6,900
OXAT	54	0	0%	AAA8	2.38	UGL	LT CRL	LT CRL	LT CRL
PB	6	0	0%	GG8, SS12	74.0, 43.4	UGL	LT CRL	LT CRL	LT CRL
PPDDE	4	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
PPDDT	4	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CRL
PRTHN	4	2	50%	UH11	0.65	UGL	LT CRL	LT CRL	1.77
SO4	4	4	100%	HH8A		MGL	135.00	130.00	150.00
SUPONA	2	0	0%	UH11	0.79	UGL	LT CRL	LT CRL	LT CRL
TCLEE	4	0	0%	N8	0.75	UGL	LT CRL	LT CRL	LT CRL
TRCLE	54	1	2%	N8	0.56	UGL	LT CRL	LT CRL	0.88
XYLEN	4	0	0%	AV8	1.36	UGL	LT CRL	LT CRL	LT CRL
ZN	4	1	25%	GG8, SS12	22.0, 18.0	UGL	LT CRL	LT CRL	23.90

D.P.A.

03/09/90

DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY SYSTEM

SITE: PWEFEF

ANALYTE	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	CERTIFIED REPORT LIMIT (LT)	UOM	MEAN	LOW VALUE	HIGH VALUE
MLTHN	1	0	0%	UH11	0.37	UGL	LT CRL	LT CRL	LT CRL
NA	2	2	100%	GG8, SS12		UGL	185,000.00	999.00	190,000
NIT	1	1	100%	LL8		UGL	6,500.00	999.00	6,50
OXAT	50	0	0%	AAA8	2.38	UGL	LT CRL	LT CRL	LT CRL
PB	3	0	0%	GG8, SS12	74.0, 43.4	UGL	LT CRL	LT CRL	LT CRL
PPDDE	2	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CR
PPDDT	2	0	0%	KK8	0.05	UGL	LT CRL	LT CRL	LT CR
PRTHN	2	1	50%	UH11	0.65	UGL	LT CRL	LT CRL	1.66
SO4	2	2	100%	HH8A		MGL	135.00	130.00	140.0
SUPONA	1	0	0%	UH11	0.79	UGL	LT CRL	LT CRL	LT CR
TCLEE	2	1	50%	N8	0.75	UGL	LT CRL	LT CRL	1.97
TRCLE	49	0	0%	N8	0.56	UGL	LT CRL	LT CRL	LT CRL
XYLEN	2	0	0%	AV8	1.36	UGL	LT CRL	LT CRL	LT CR
ZN	2	0	0%	GG8, SS12	22.0, 18.0	UGL	LT CRL	LT CRL	LT CRL

ROCKY MOUNTAIN ARSENAL
NORTHWEST BOUNDARY CONTAINMENT\TREATMENT SYSTEM
GC/MS ANALYTICAL DATA

LABORATORY: DATACHEM
SAMPLE DATE: 06/21/89
UNIT OF MEASURE: UGL

ANALYTE	CODE	PWININ	PWEFEF
2,3,6-TRICHLOROPHENOL	236TCP	LT 1.70	LT 1.70
2,4,5-TRICHLOROPHENOL	245TCP	LT 2.80	LT 2.80
2,4,6-TRICHLOROPHENOL	246TCP	LT 3.60	LT 3.60
2,4-DICHLOROPHENOL	24DCLP	LT 8.40	LT 8.40
2,4-DIMETHYLPHENOL	24DMPN	LT 4.40	LT 4.40
2,4-DINITROPHENOL	24DNP	LT 176.00	LT 176.00
2-CHLOROPHENOL	2CLP	LT 2.80	LT 2.80
2-METHYLPHENOL	2MP	LT 3.60	LT 3.60
2-NITROPHENOL	2NP	LT 8.20	LT 8.20
3-METHYL-4-CHLOROPHENOL	4CL3C	LT 8.50	LT 8.50
4-METHYLPHENOL	4MP	LT 2.80	LT 2.80
4-NITROPHENOL	4NP	LT 96.00	LT 96.00
ALDRIN	ALDRN	LT 13.00	LT 13.00
ATRAZINE	ATZ	LT 5.90	LT 5.90
HEXACHLOROCYCLOPENTADIENE (HCCPD)	CL6CP	LT 54.00	LT 54.00
CHLORDANE	CLDAN	LT 37.00	LT 37.00
P-CHLOROPHENYLMETHYL SULFIDE	CPMS	LT 10.00	LT 10.00
P-CHLOROPHENYLMETHYL SULFOXIDE	CPMSO	LT 15.00	LT 15.00
P-CHLOROPHENYLMETHYL SULFONE	CPMSO2	LT 5.30	LT 5.30
DIBROMOCHLOROPROPANE	DBCP	LT 12.00	LT 12.00
DICYCLOPENTADIENE	DCPD	LT 5.50	LT 5.50
VAPONA	DDVP	LT 8.50	LT 8.50
DIISOPROPYLMETHYLPHOSPHONATE	DIMP	LT 21.00	LT 21.00
DITHIANE	DITH	LT 3.30	LT 3.30
DIELDRIN	DLDRN	LT 26.00	LT 26.00
DIMETHYLMETHYLPHOSPHATE	DMMP	LT 130.00	LT 130.00
ENDRIN	ENDRN	LT 18.00	LT 18.00
ISODRIN	ISODR	LT 7.80	LT 7.80
MALATHION	MLTHN	LT 21.00	LT 21.00
1,4-OXATHIANE	OXAT	LT 27.00	LT 27.00
PENTACHLOROPHENOL	PCP	LT 9.10	LT 9.10
PHENOL	PHENOL	LT 2.20	LT 2.20
2,2-BIS(PARA-CHLOROPHENYL)-1,1-DICHLOROETHENE	PPDDE	LT 14.00	LT 14.00
2,2-BIS(PARA-CHLOROPHENYL)1,1,1-TRICHLOROETHANE	PPDDT	LT 18.00	LT 18.00
PARATHION	PRTHN	LT 37.00	LT 37.00
SUPONA	SUPONA	LT 19.00	LT 19.00

APPENDIX C

DEWATERING WELL DATA

D.P.A.

03/20/90

DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: ALDRN
CERTIFIED REPORTING LIMIT (LT): 0.05

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
2	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.45
3	3	2	67%	KK8	UGL	LT CRL	LT CRL	0.08
4	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.06
5	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.08
6	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
7	4	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
8	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
9	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
10	4	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
11	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.06
12	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.09
13	4	1	25%	KK8	UGL	LT CRL	LT CRL	0.08
14	4	2	50%	KK8	UGL	LT CRL	LT CRL	0.23
15	4	1	25%	KK8	UGL	LT CRL	LT CRL	0.12

D.P.A.

03/20/90

DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: CHLORIDE
CERTIFIED REPORTING LIMIT (LT): 0.72, 0.278

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	3	100%	HH8A	MGL	166.67	160.00	170.00
2	3	3	100%	HH8A	MGL	183.33	180.00	190.00
3	3	3	100%	HH8A	MGL	263.33	210.00	330.00
4	3	3	100%	HH8A, TT09	MGL	230.00	190.00	260.00
5	3	3	100%	HH8A, TT09	MGL	243.33	210.00	300.00
6	3	3	100%	HH8A, TT09	MGL	280.00	250.00	300.00
7	3	3	100%	HH8A, TT09	MGL	286.67	270.00	310.00
8	3	3	100%	HH8A, TT09	MGL	306.67	290.00	340.00
9	3	3	100%	HH8A, TT09	MGL	263.33	230.00	290.00
10	3	3	100%	HH8A, TT09	MGL	276.67	250.00	300.00
11	4	4	100%	HH8A, TT09	MGL	367.50	300.00	440.00
12	4	4	100%	HH8A, TT09	MGL	322.50	280.00	390.00
13	4	4	100%	HH8A, TT09	MGL	417.50	290.00	680.00
14	5	5	100%	HH8A, TT09	MGL	566.00	430.00	780.00
15	3	3	100%	HH8A	MGL	586.67	520.00	690.00

D.P.A.

03/20/90

DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: COMB. ORGANO-SULFUR
CERTIFIED REPORTING LIMIT (LT): 24.65

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
2	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
3	1	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
4	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
5	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
6	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
7	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
8	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
9	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
10	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
11	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
12	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
13	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
14	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
15	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL

D.P.A.

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DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: DBCP
CERTIFIED REPORTING LIMIT (LT): 0.195

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
2	3	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
3	2	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
4	3	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
5	3	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
6	3	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
7	4	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
8	4	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
9	4	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
10	3	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
11	3	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
12	3	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
13	4	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
14	3	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL
15	4	0	0%	AY8	UGL	LT CRL	LT CRL	LT CRL

D.P.A.

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DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: DCPD
CERTIFIED REPORTING LIMIT (LT): 5

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
2	3	1	33%	P8	UGL	LT CRL	LT CRL	9.82
3	3	2	67%	P8	UGL	LT CRL	LT CRL	14.60
4	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
5	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
6	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
7	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
8	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
9	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
10	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
11	4	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
12	4	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
13	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
14	4	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL
15	3	0	0%	P8	UGL	LT CRL	LT CRL	LT CRL

D.P.A.

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DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: DIMP
CERTIFIED REPORTING LIMIT (LT): 0.65

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	1	33%	AW8A	UGL	LT CRL	LT CRL	1.35
2	3	1	33%	AW8A	UGL	LT CRL	LT CRL	1.70
3	3	3	100%	AW8A	UGL	19.98	1.35	57.20
4	3	3	100%	AW8A	UGL	1.73	1.35	2.34
5	3	3	100%	AW8A	UGL	2.00	1.23	3.04
6	3	3	100%	AW8A	UGL	3.93	3.53	4.26
7	4	4	100%	AW8A	UGL	3.81	3.36	4.39
8	4	4	100%	AW8A	UGL	4.89	4.47	5.34
9	4	4	100%	AW8A	UGL	4.57	4.20	5.11
10	4	4	100%	AW8A	UGL	4.54	4.01	4.96
11	3	3	100%	AW8A	UGL	6.83	5.19	8.07
12	3	3	100%	AW8A	UGL	4.55	3.65	5.43
13	4	4	100%	AW8A	UGL	9.62	4.58	15.10
14	3	3	100%	AW8A	UGL	9.91	7.96	12.60
15	4	4	100%	AW8A	UGL	178.82	3.85	690.00

D.P.A.

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DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: DITH
CERTIFIED REPORTING LIMIT (LT): 1.34

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
2	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
3	1	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
4	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
5	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
6	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
7	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
8	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
9	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
10	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
11	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
12	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
13	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
14	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
15	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL

D.P.A.

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DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: DLDRN
CERTIFIED REPORTING LIMIT (LT): 0.05

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	3	100%	KK8	UGL	0.44	0.24	0.68
2	3	3	100%	KK8	UGL	0.65	0.41	1.10
3	3	3	100%	KK8	UGL	1.00	0.81	1.10
4	3	3	100%	KK8	UGL	0.65	0.60	0.73
5	3	3	100%	KK8	UGL	0.59	0.52	0.65
6	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.24
7	4	4	100%	KK8	UGL	0.43	0.16	0.56
8	3	3	100%	KK8	UGL	0.27	0.23	0.31
9	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
10	4	4	100%	KK8	UGL	0.18	0.05	0.49
11	3	3	100%	KK8	UGL	0.52	0.35	0.63
12	3	3	100%	KK8	UGL	0.29	0.24	0.33
13	4	4	100%	KK8	UGL	2.22	0.47	7.00
14	4	4	100%	KK8	UGL	0.68	0.64	0.76
15	4	4	100%	KK8	UGL	1.56	0.51	4.40

D.P.A.

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DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: ENDRN
CERTIFIED REPORTING LIMIT (LT): 0.05

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
2	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.47
3	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
4	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
5	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
6	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
7	4	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
8	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
9	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
10	4	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
11	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
12	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
13	4	1	25%	KK8	UGL	LT CRL	LT CRL	0.07
14	4	4	100%	KK8	UGL	0.12	0.08	0.19
15	4	3	75%	KK8	UGL	0.19	0.07	0.09

D.P.A.

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DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: FLUORIDE
CERTIFIED REPORTING LIMIT (LT): 0.482, 0.153

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	3	100%	HH8A	MGL	1.42	1.39	1.46
2	3	3	100%	HH8A	MGL	1.60	1.54	1.71
3	3	3	100%	HH8A	MGL	1.78	1.55	1.95
4	3	3	100%	HH8A, TT09	MGL	1.76	1.48	2.01
5	3	3	100%	HH8A, TT09	MGL	1.83	1.65	2.11
6	3	3	100%	HH8A, TT09	MGL	2.24	2.03	2.45
7	3	3	100%	HH8A, TT09	MGL	2.18	1.99	2.48
8	3	3	100%	HH8A, TT09	MGL	3.10	2.00	4.86
9	3	3	100%	HH8A, TT09	MGL	1.82	1.45	2.30
10	3	3	100%	HH8A, TT09	MGL	2.05	1.72	2.26
11	4	4	100%	HH8A, TT09	MGL	2.42	1.80	3.13
12	4	4	100%	HH8A, TT09	MGL	2.47	1.89	2.81
13	4	4	100%	HH8A, TT09	MGL	3.13	1.97	4.64
14	5	5	100%	HH8A, TT09	MGL	3.58	3.00	4.30
15	3	3	100%	HH8A	MGL	3.99	3.59	4.77

D.P.A.

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DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: ISODR
CERTIFIED REPORTING LIMIT (LT): 0.051

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
2	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
3	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.08
4	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
5	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
6	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
7	4	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
8	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.07
9	3	0	0%	KK8	UGL	LT CRL	LT CRL	LT CRL
10	4	1	25%	KK8	UGL	LT CRL	LT CRL	0.62
11	3	2	67%	KK8	UGL	LT CRL	LT CRL	0.18
12	3	1	33%	KK8	UGL	LT CRL	LT CRL	0.09
13	4	1	25%	KK8	UGL	LT CRL	LT CRL	0.07
14	4	2	50%	KK8	UGL	LT CRL	LT CRL	0.28
15	4	2	50%	KK8	UGL	LT CRL	LT CRL	0.35

D.P.A.

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DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: OXAT
CERTIFIED REPORTING LIMIT (LT): 2.38

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
2	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
3	1	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
4	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
5	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
6	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
7	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
8	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
9	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
10	3	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
11	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
12	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
13	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
14	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL
15	4	0	0%	AAA8	UGL	LT CRL	LT CRL	LT CRL

D.P.A.

03/20/90

DATACHEM
FY 89 STATISTICAL SUMMARY
NORTHWEST BOUNDARY DEWATERING WELLS

ANALYTE: TRCLE
CERTIFIED REPORTING LIMIT (LT): 0.56

WELL NO.	TOT SAMP	SAMP >CRL	% > CRL	MTH NO.	UOM	MEAN	LOW VALUE	HIGH VALUE
1	3	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
2	3	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
3	3	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
4	3	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
5	3	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
6	3	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
7	4	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
8	4	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
9	4	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
10	4	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
11	3	1	33%	N8	UGL	LT CRL	LT CRL	0.67
12	3	0	0%	N8	UGL	LT CRL	LT CRL	LT CRL
13	4	1	25%	N8	UGL	LT CRL	LT CRL	1.27
14	4	4	100%	N8	UGL	1.09	0.74	1.44
15	4	1	25%	N8	UGL	LT CRL	LT CRL	1.30

APPENDIX D

NORTHWEST BOUNDARY SYSTEM DOWNTIME

NORTHWEST BOUNDARY

1st QUARTER FISCAL YEAR 90

QUARTERLY DOWNTIME SUMMARY

DATE	ADS/TIME LOSS	JUSTIFICATION
12 OCT 88	ALL/.25 hrs	Plant power off - check transformer
21 OCT 88	ALL/5.25 hrs	Water leaks - main line and filter pod

NO LOSS OF PLANT OPERATIONS DUE TO DOWNTIME WAS REPORTED FOR THE MONTH OF NOVEMBER 1988.

01 DEC 88	V102/18.75	Install R.C. Line Cleanout
02 DEC 88	V102/7.00	Install R.C. Line Cleanout

1st QUARTER REPORT

FISCAL YEAR 19989

NORTHWEST BOUNDARY PLANT
DOWNTIME SUMMARY BY ADSORBER

ADSORBER	TIME LOSS (HRS)			
	OCT 88	NOV 88	DEC 88	1st QTR FY 1989
V101	0.00	0.00	0.00	0.00
V102	0.00	0.00	25.75	25.75
V103	0.00	0.00	0.00	0.00
ALL (the the same time)	5.50	0.00	0.00	5.50

NORTHWEST BOUNDARY SYSTEM
2nd QUARTER REPORT
FISCAL YEAR 1989

AVERAGE FLOWS:

Area of Consideration	Time Period	1 Jan - 1 Feb 89	1 Feb - 30 Nov 89	1 Mar - 31 Dec 89	1 Jan - 1 Apr 89
Recharge Wells (RC)	- Flow	545.04 gpm	558.37 gpm	591.36 gpm	564.81 gpm
	- Total	24,330,500 gal	22,513,400 gal	26,398,200 gal	73,242,100 gal
Dewatering Wells (DW)	- Flow	482.44 gpm	527.68 gpm	504.23 gpm	504.78 gpm
	- Total	21,535,900 gal	21,276,000 gal	22,508,900 gal	65,320,800 gal
Plant (All Ads)	- Flow	585.49 gpm	618.62 gpm	650.45 gpm	285.23 gpm
	- Total	26,136,000 gal	24,943,000 gal	29,036,000 gal	80,115,000 gal
Ads 101	- Flow	0.00 gpm	199.08 gpm	361.16 gpm	186.75 gpm
	- Total	0 gal	8,027,000 gal	16,122,000 gal	24,149,000 gpm
Ads 102	- Flow	351.12 gpm	141.65 gpm	0.00 gpm	164.26 gpm
	- Total	15,674,000 gal	5,711,000 gal	0 gal	21,385,000 gal
Ads 103	- Flow	234.37 gpm	277.89 gpm	289.29 gpm	267.18 gpm
	- Total	10,462,000 gal	11,205,000 gal	12,914,000 gal	34,581,000 gal

NORTHWEST BOUNDARY SYSTEM
PLANT DOWNTIME SUMMARY
2nd QUARTER 1989

PLANT SUMMARY

PERIOD: 1 Jan - 1 Apr 89

DATE	ADS/LOSS TIME		JUSTIFICATION
10 Feb 89	102/4.17	hrs.	Plugged Line
10 Feb 89	103/4.42	hrs.	Plugged Line
14 Feb 89	102/11.00	hrs.	Plugged Line
14 Feb 89	103/5.67	hrs.	Plugged Line
15 Feb 89	101/13.42	hrs.	Restart/Opns.
15 Feb 89	102/5.58	hrs.	Stop/Opns.
15 Feb 89	103/13.42	hrs.	Plugged Filter

NORTHWEST BOUNDARY SYSTEM
PLANT DOWNTIME SUMMARY
3rd QUARTER 1989

PERIOD 1 Apr - 1 Jul 89

NOTE: There was no downtime for the entire 3rd quarter in Fiscal Year 1989.

NORTHWEST BOUNDARY SYSTEM
3rd QUARTER REPORT
FISCAL YEAR 1989

AVERAGE FLOWS:

Area of Consideration	Time Period	1 Apr - 1 May 89	1 May - 30 Jun 89	1 Jun - 31 Jul 89	1 Apr - 1 Jul 89
Recharge Wells (RC)	- Flow	618.11 gpm	605.49 gpm	593.94 gpm	605.85 gpm
	- Total	26,702,100 gal	27,029,200 gal	25,658,000 gal	79,389,300 gal
Dewatering Wells (DW)	- Flow	675.25 gpm	598.05 gpm	589.49 gpm	620.93 gpm
	- Total	29,170,600 gal	26,969,900 gal	25,466,100 gal	81,333,600 gal
Plant (All Ads)	- Flow	684.96 gpm	667.04 gpm	658.27 gpm	670.09 gpm
	- Total	29,590,000 gal	29,777,000 gal	28,437,000 gal	87,804,000 gal
Ads 101	- Flow	336.80 gpm	339.14 gpm	658.27 gpm	670.09 gpm
	- Total	14,550,000 gal	15,139,000 gal	14,455,000 gal	44,144,000 gpm
Ads 102	- Flow	0.00 gpm	0.00 gpm	0.00 gpm	0.00 gpm
	- Total	0 gal	0 gal	0 gal	00 gal
Ads 103	- Flow	348.15 gpm	327.90 gpm	323.66 gpm	333.24 gpm
	- Total	15,040,000 gal	14,638,000 gal	13,982,000 gal	43,660,000 gal

NORTHWEST BOUNDARY SYSTEM
4th QUARTER REPORT
FISCAL YEAR 1989

AVERAGE FLOWS:

Area of Consideration	Time Period	1 Jul - 1 Aug 89	1 Aug - 30 Sep 89	1 Sep - 31 Oct 89	1 Jul - 1 Oct 89
Recharge Wells (RC)	- Flow	562.83 gpm	523.07 gpm	530.19 gpm	538.69 gpm
	- Total	25,124,800 gal	23,349,700 gal	22,903,800 gal	71,378,300 gal
Dewatering Wells (DW)	- Flow	588.85 gpm	528.45 gpm	551.29 gpm	556.20 gpm
	- Total	29,947,100 gal	23,589,800 gal	23,815,600 gal	72,352,500 gal
Plant (All Ads)	- Flow	622.19 gpm	582.27 gpm	611.27 gpm	605.24 gpm
	- Total	27,775,000 gal	25,992,000 gal	24,406,900 gal	78,1739000 gal
Ads 101	- Flow	348.46 gpm	348.15 gpm	347.63 gpm	348.08 gpm
	- Total	15,555,000 gal	15,541,000 gal	15,071,500 gal	46,167,500 gpm
Ads 102	- Flow	0.00 gpm	45.86 gpm*	248.80 gpm	98.22 gpm
	- Total	0 gal	2,047,000 gal	10,748,000 gal	12,795,000 gal
Ads 103	- Flow	273.73 gpm	188.26 gpm	14.84 gpm^	158.94 gpm
	- Total	12,220,000 gal	8,404,000 gal	614,300 gal	21,238,300 gal

Note: * Start up adsorber V-102. + Shutting down adsorber V-103. ^ Adsorber V-103 run while V-102 has a new meter installed.